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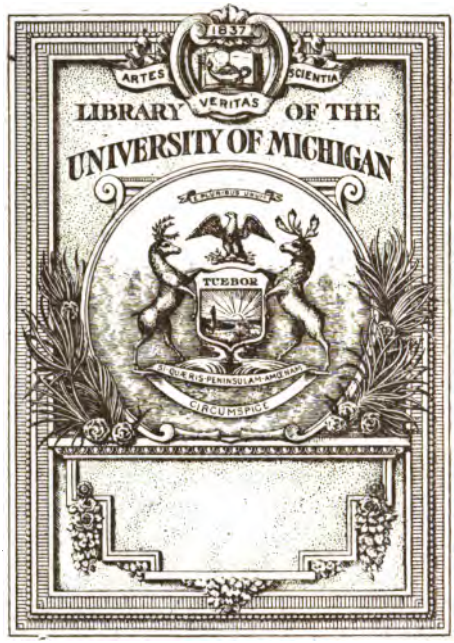
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ON THE

COAL MEASURES

OF THE

PLATEAU REGION OF ALABAMA,

BY

HENRY McCALLEY,
ASSISTANT STATE GEOLOGIST,

INCLUDING

A REPORT

ON THE

COAL MEASURES OF BLOUNT COUNTY.

BY

A. M. GIBSON.

With a Map of the Coal Fields and two Geological Sections across the Plateau Region and Intermediate Valleys.

MONTGOMERY, ALA.:
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1891.

PREFACE.

In the following pages, mention is frequently made of the geological formations underlying the Coal Measures and appearing in the Valleys that separate the Coal Plateaus.

For the better understanding of the relative position of these formations, their prevailing constituents, and the names used to designate them,—the following short account has been prepared,—in which they are taken up in descending order.

COAL MEASURES.

As Mr. McCalley states, it is, as a rule, only the lower strata of the Coal Measures that appear in the Plateau Region. These consist of two Conglomerates underlying a variable thickness of other strata, and separated by about 150 feet of sandy shales; and, below the Conglomerates, of 300 or 400 feet of shales and sandstones. The number and characters of the coal seams appearing in these lower measures are sufficiently well shown in the report.

SUB-CARBONIFEROUS.

The Sub-Carboniferous strata consist of a limestone, shales and sandstone, forming what we have called the upper division, and a series of cherty or siliceous limestones forming the lower division. The whole thickness of the formation will average not less than 1200 feet.

Upper Division.—The limestone which is commonly found immediately below the Coal Measures is known as the Mountain Limestone or Bangor Limestone, probably equiv-

alent to the Chester group of the Western Geologists; the shales and sandstones below this limestone have been called the Oxmoor beds from the region of their most characteristic occurrence, but in the following pages an older name is most frequently used by Mr. McCalley, viz., LaGrange Sandstone. This sandstone always makes a marked topographic feature in the valleys separating the different parts of the plateau region. The limestone and sandstones and shales together will average perhaps 1000 feet in thickness.

Lower Division.—As already said, this division consists in the main of cherty or siliceous limestones, especially in the northern part of the area here described, i. e., in the Tennessee Valley, where two well marked distinctions can always be made. These are the strata that make the "Barrens" and the "Red Lands," respectively, of the Valley. In the anticlinal valleys which separate the plateaus it is impossible to make this distinction, for the whole of this lower division shows upon the surface at least, very little else than angular fragments of chert (or "flint") which are usually full of impressions and moulds of fossils, and hence spoken of commonly by Mr. McCalley as fossiliferous chert. A better name would be "Fort Payne chert," a name adopted by the Survey in the Cahaba Report lately published. The thickness of the cherty limestones may average perhaps 400 feet. They are, in the main, the equivalents of the St. Louis, Keokuk, and Burlington beds of the Western Geologists.

DEVONIAN.

The only representative in Alabama of the Devonian formation is found in a thin stratum of Black Shale, averaging perhaps, in the region of this report, not more than ten or fifteen feet in thickness. It is usually designated as the Black Shale in our reports.

SILURIAN.

The *Clinton* or *Red Mountain* formation is the uppermost of the Silurian divisions defined in our State. It consists of sandstones, shales, and red iron ore, aggregating some 100 feet in thickness.

The *Trenton* or *Pelham* limestone, 800 feet in average thickness, includes a variety of calcareous strata, tolerably pure above and shaly in the lower part.

Knox Dolomite.—This is one of the most important of the formations occurring in the Valleys, since its strata occupy a large proportion of the area of these valleys. The materials of the Knox Dolomite are mostly siliceous or cherty limestones and dolomites, and by the leaching out of the calcareous parts, the cherty or siliceous portions are usually left as a surface mantle of angular flinty gravel. This formation is otherwise important as bearing the greater part of the brown iron ore of the State. It is difficult to arrive at a very reliable estimate of the thickness of this division, but it cannot be less than 5,000 feet.

CAMBRIAN.

The divisions of the Cambrian in Alabama in descending order, are the *Choccolocco* or *Montevallo Shales* and the *Coosa Shales*, and, interbedded with the former, in the eastern part of the Coosa Valley, great masses of coarse grained sandstone, forming what we have termed the *Weisner Quartzite.* In the Valleys treated of in this report, we can usually distinguish only the lower or Coosa Shale division. The rocks of this division (Coosa Shale) are thin-bedded limestones with clay seams between, and in disintegrating they give rise to heavy clay soils, which, on account of the generally very level nature of the country made by them, justify the popular name of "Flatwoods" by which they are everywhere known and designated.

Inasmuch as the sandstones and sandy shales of the Cambrian are found only along the eastern border of the area of occurrence of Cambrian strata in this State, it seems quite probable that in the western part of this area, calcareous strata were accumulating during the whole of the period of the Cambrian, and that the "Flatwoods" limestones with their interbedded clay seams are the time equivalents, not only of the Coosa Shales, but also of the Choccolocco or Montevallo Shales and their included sandstones.

We have not yet the data necessary for determining the thickness of the Cambrian strata in Alabama; but in the eastern part of the Coosa Valley—where the great mountain-making sandstones or quartzites are included in the shales, the thickness can hardly be less than 10,000 feet. In the Valleys mentioned in this Report the Cambrian rocks are much thinner.

It will be seen in the Reports of Messrs. McCalley and Gibson that certain parts of this Plateau Region are likely to prove to be important Coal areas, especially the Blount Mountain and Berry Mountain regions.

Further investigations are now being carried on there for the Geological Survey—by Mr. Gibson.

EUGENE A. SMITH.

ON THE

COAL MEASURES

OF THE

PLATEAU REGION OF ALABAMA.

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LETTER OF TRANSMITTAL.

DR. E. A. SMITH,
State Geologist:

SIR:—The following is a report of the Coal Measures of the Plateau Region of Alabama.

It treats of all of the Coal Measures of the Plateau Region of the State with the exception of those that were included in the Report on the Warrior Coal Field, published in 1886. It also speaks of the Coal Measures of St. Clair and Shelby counties because the measures of those counties are principally of plateau strata and have never been considered as a whole, in the case of either of the counties, in any previous report. It is of notes that have been taken on different trips during the last twelve years, and while it does not pretend to be a final report or to represent a complete examination of the measures of which it treats, yet it is believed to give a good general idea of them and especially of their coal seams.

The Introduction is a general description of the Plateau Region as a whole, and the body of the report is a detailed description of the Coal Measures of the counties of Madison, Jackson, Marshall, Morgan, Lawrence, Franklin, DeKalb, Cherokee, Etowah, Blount, St. Clair and Shelby.

The report also includes some additional notes by Gen. A. M. Gibson to his report of 1886 on the Coal Measures of Blount Mountain, and a short report by him on the Coal Measures of Berry Mountain, a part of the Raccoon Mountain.

It also includes a great number of *bed sections* of coal outcroppings on Raccoon and Blount Mountains, that were kindly furnished, without cost to the Survey, by the L. & N. R. R., for which I here extend my thanks.

It also includes a map showing the location of the Coal Measures of the State, and two sections showing the structures of the mountains of the Plateau Region and of the intermediate valleys.

Very respectfully,

HENRY MCCALLEY.

University of Alabama,
June 1, 1891.

I. INTRODUCTION.

THE COAL MEASURES OF THE PLATEAU REGION OF ALABAMA.

The Plateau Region of Alabama consists of the high, wide flat and plainlike areas of the tops of the Cumberland Mountains, Sand Mountain, Raccoon Mountain and Lookout Mountain. These names are more or less indefinite in their applications, but as used in the following pages the *Cumberland Mountains* include all the mountain spurs, etc., to the north of the Tennessee River; *Sand Mountain* the high escarpment and plateau to the south of that river and Moulton Valley, and to the north-west of the Brown's or Blountsville Valley; *Raccoon Mountain* the high broad plateau to the south-east of the Brown's or Blountsville Valley and to the north-west of Big Wills' Valley; and *Lookout Mountain*, the extension into Alabama of the Lookout Mountain of Tennessee and Georgia, is between Little Wills' Valley on the north west and the Coosa Valley on the south-east. (See map and sections.)

This Plateau Region is made up entirely of Coal Measures, though the mountains of which it forms the tops are separated from each other by, and have running up into them, deep valleys denuded down into Sub-carboniferous and much lower rocks, geologically speaking. These valleys, with the exception of the Tennessee Valley below Guntersville, are anticlinal valleys and have a general north-east and south-west trend.

The plateaus or Coal Measures of these mountains are sharply defined by high abrupt bluffs which cap the Sub-car-

boniferous rocks of the steep mountain sides. These steep mountain sides have usually one or more benches on them. The Plateau Region of Alabama as above marked out comprises some 4,500 square miles. It is from 1,000 to 2,000 feet above tide water level, and from 300 to 1200 feet above the level of the adjacent valleys. It is most elevated in the north-east corner of the State and gradually slopes from this point to the south-west. The portions of the different mountains are highest along their edges or rims, next to the anticlinal valleys, and gradually slope and dip in undulations away from these elevated rims. These portions are therefore all broad shallow synclinal troughs or parts of such troughs. Their strata, and so their surfaces in many places, are in long flat waves from north-east to south-west and also from north-west to south-east. The waves from north-east to south-west are usually much larger than the others. The Plateau Region is a country of beautiful, wild and interesting scenery. It is, away from the edges of the mountains and the water courses, generally an open woods country, with but little undergrowth and with a luxuriant growth of grasses and ferns, and is just enough rolling and indented with hollows and ravines to make the landscape pleasing to the eye, but on the edges of the mountains and on the water courses it is quite different, and the scenery is often grand, wild, and picturesque. The elevated high bluffs, etc., of its borders or of the tops of its steep mountain sides, and the high water falls, etc., of its creeks and branches often produce sights that are well worth the travel of many miles to see.

This Plateau Region has a mild and salubrious climate, and an atmosphere that is so pure, dry and light, as to be a perfect safe-guard against the chills and fevers of the valleys. The mean winter temperature for December, January, and February is about 44° F; the mean summer temperature for June, July and August is about 76° F; and the mean annual temperature is about 55° F. The annual summer temperature is several degrees less than that of the valleys. The drainage is perfect and so it is infected with no marshes or mala-

rial causes. The mean winter rainfall is about 14 inches, the mean summer rainfall about 13 inches, and the mean annual rainfall about 55 inches.

Under the high bluffs capping the mountain sides are numerous fine free flowing springs of freestone, chalybeate and alum waters. These springs, from 200 to 1000 feet above the valleys, furnish the coldest natural waters of the State. They, according to Prof. Tuomy, have an annual temperature of about 55° F., while those of the valleys have an annual temperature of about 60° F.

The soil is naturally poor and thin; it is principally a light, more or less yellowish, sandy loam, that is deficient in organic matter, lime, and phosphorus, though it has a fair amount of potash. It however grows well, without help, the choicest of root and fruit crops and grasses, and with frequent light applications of a suitable compost, as a superphosphate of lime and green crops, can be made to yield a good diversity of crops that are equal in every respect to those raised in sections that are much more highly favored in natural fertility of soil. Thus treated it will bring good cotton, corn, oats, rye, rice, sorghum, Irish and sweet potatoes, turnips, ground peas, etc., etc. It can easily be made to yield to the acre 250 lbs., of lint cotton, of much better staple than that of the valleys, or 25 bushels of corn. The soil is most easily cultivated; and though they may be poor, there is no class of people that live better with less work than do the farmers of this region. The natural pasturage is fine and supports the cattle of the valley as well as those of the mountains for some eight months in the year.

This region is still for the most part covered with its virgin forests of post oaks, Spanish oaks, scarlet oaks, tan bark oaks, black oaks, chestnuts, hickories, gums, short and long leaf pines, dogwood, sour-wood and sassafras. The steep mountain sides and the coves have, in many localities, been covered with a fine growth of the best of hard woods, as red cedars, black walnuts, chestnut oaks, yellow poplar, white ash, white oaks, red or sweet gum, linden trees, elms, hickories, beech, etc. These lands are now however being rapidly

cleared up and as the virgin soils are becoming better understood, are growing into great favor as most desirable horticultural and farming lands. This region is also as yet thinly settled, on account of the supposed sterility of its soil, but as its great natural advantages are recognized, it will doubtless become more and more popular and will probably eventually, on account of its delightful and invigorating climate and healthfulness and fine water, be dotted over with public and private summer retreats from the turmoil, heat, mud, dust and smoke of the booming towns and cities. Over the bluffs above the springs there are often beautiful sites for these summer retreats, and from these sites the views are magnificent and extend for miles, uninterrupted, up and down the valleys.

The Coal Measures of this Plateau Region are made up for the most part of the hard conglomerates near the base of the measures and of the measures under and between these conglomerates. These measures can perhaps be best described by giving a section of them where they are well developed and then referring the different out crops, etc., to their respective places in this section. They are well developed at the Etna Mines, Tennesse, near the Alabama line, and hence the following section is given:

ETNA SECTION.

Sandstone, 73 ft.
Shaly Sandstone, 32 ft.
(10) COAL, 4 ft.
Slate, with a thin *COAL*, 46 ft.
(9) COAL; with Slate parting, 6 ft.
Shale, 44 ft.
(8) COAL, (*Kelly Seam*); 2 to 5 ft.
Fire Clay, 1½ ft.
(7½) SANDSTONE (*Upper Conglomerate*), 82 ft.
(7) COAL, ¼ ft.
Yellow Sandy Shale, 45.
COAL; thin.
Gray Shale, 47 ft.
(6) COAL, (*Sewanee Seam*); 1 to 2 ft.
Gray Sandy Shales, 45 ft.

ETNA SECTION—continued.

(5½) CONGLOMERATE (LOWER); *Cliff Rock, Millstone Grit*, 96 ft.
(5) COAL, (*Main Etna Seam*); 2 to 5 ft.
Fire Clay, 2 ft.
Shale, 20 ft.
(4) COAL, (*Dade or Eureka Seam*); 1 ft.
Gray Shale, 95 ft.
[3] COAL, ½ ft.
Black Shale with iron, 20 ft.
(2) COAL, 3 ft.
Shale with iron balls, 40 ft.
Gray Shale, 34 ft.
(1) COAL, 2 ft.
Fire Clay, 2 ft.
Shales and Sandstones, 100 ft.

MOUNTAIN LIMESTONE.

The above section is taken from the Report of Prof. Henry E. Colton, Geologist and Inspector of Mines, Tennessee, 1883.

The high bluffs spoken of as capping the steep mountain sides and as sharply defining the Plateau Region, when there are two of these bluffs one above the other as is usually the case, are formed of the conglomerates (5½) and (7½) of the above section, and when there is only one row of bluffs of the *Conglomerate* (5½) alone. The *Conglomerate* (5½), the *Lower Conglomerate* of Safford, is commonly known as the *Millstone Grit* and as the *Cliff Rock*. The *Conglomerate* (7½), a sandstone in the above section, is the *Upper Conglomerate* of Safford. The Upper Conglomerate is the surface rock over most of the Plateau Region. It often times crops out back from the brinks of the mountains, and along the creeks and branches, and occasionally in naked glady places over the tops of mountains.

These conglomerates give to the Plateau Region not only its distinct outlines, but also its prominence and perhaps even its existence since; but for the hard weather resisting qualities of these rocks the Plateau Region would probably have long since been, for the most part, washed away. These conglomerates vary very much in thickness and com-

position. They usually carry smali rounded flint pebbles, but occasionally they are nothing more than coarse quartzose sandstones, that on weathering become sometimes merely heaps of loose sand that glistens in the sun-light. The small rounded flint pebbles in them occur sometimes intimately mixed throughout the masses of the rocks, sometimes in only the upper parts of the rocks, and most often in irregular patches or seams near the bottoms of the rocks. These two conglomerates are usually separated from each other by from 25 to 30 feet of other strata, but occasionally they come together and at other times are as much as 150 feet apart. The lower of these two conglomerates is, as a general thing, much the thicker and harder of the two. In many places it is well suited for millstones and in a few localities has been so used, hence its name *Millstone Grit.* These conglomerate bluffs are frequently seen from the valleys below to be in great waves from north-east to south-west.

In these conglomerates, and between and under them, there are frequently seams of flagstones of great regularity in thickness with either perfectly smooth or beautifully rippled marked sides. These flagstones are well suited for curbing and paving purposes and some of them are of good coarse sharp grit for whetstones and grindstones.

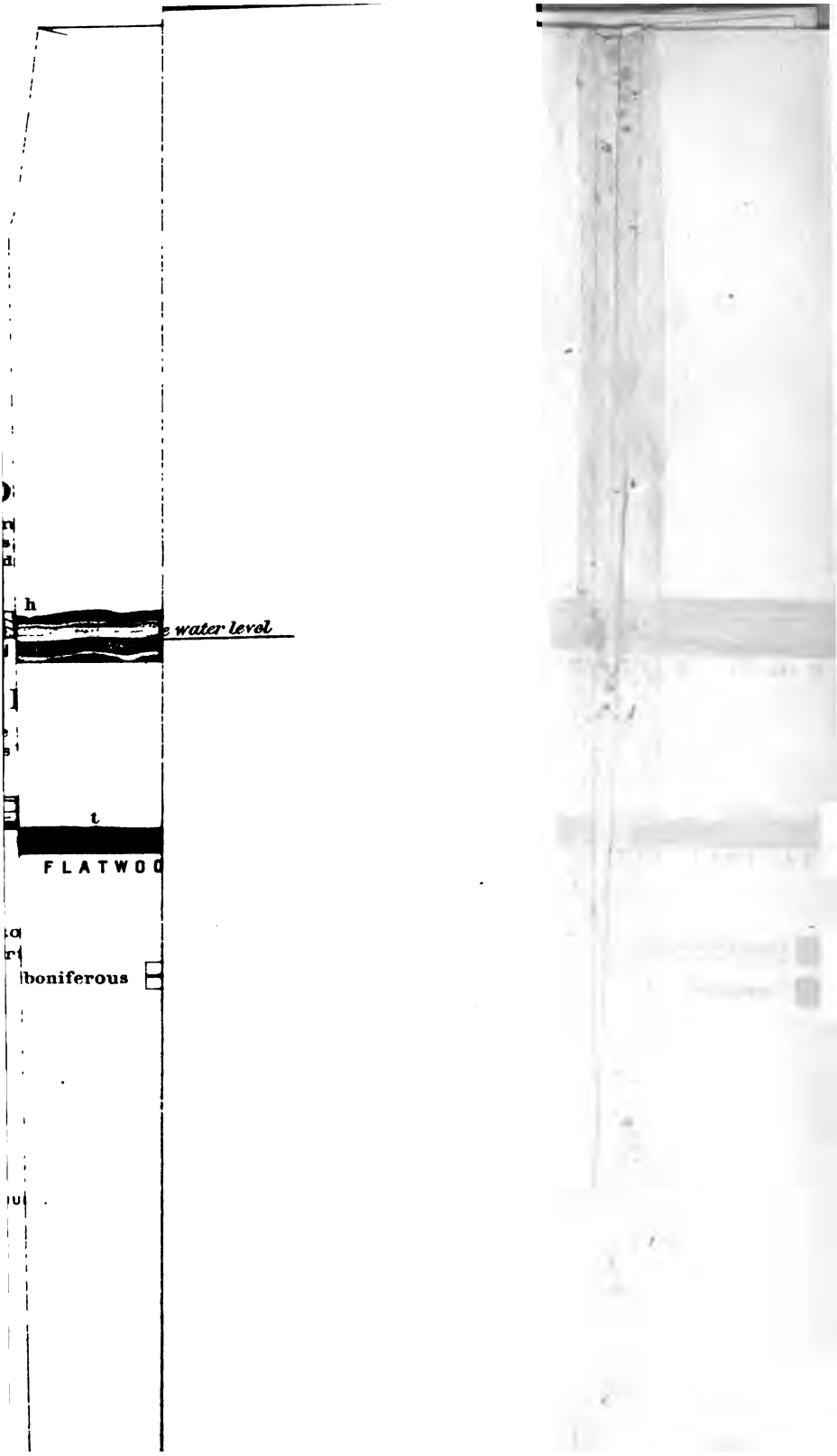
The Coal Measures below or under the *Lower Conglomerate* (5½) or the *Millstone Grit* have been called the *Lower Measures*, and those above or over the *Upper Conglomerate* (7½), the *Upper Measures.* The Lower Measures of the Plateau Region of Alabama are usually from 40 to 50 feet in thickness though they sometimes swell up to a thickness of 700 feet or more. They have also been called the *false measures;* improperly so, however, for the reason that they bear in places from one to five coal seams, and have furnished, mainly from one seam, about all of the coal that has ever been taken from the Plateau Region of Alabama and from many localities in Tennessee. The *Lower Measures* however in a general way do become more and more barren towards the south-west, or their coals thin out in this general direction. The most reliable or most persistent and, as a

general thing, thickest coal seam of the *Plateau Region* is of the seam that has furnished about all of the coal that has ever been taken from the Plateau Region of Alabama and from many localities in Tennessee. It is (5) of the Etna Section and is known as the *Cliff Seam.* It occurs just under the *Lower Conglomerate* or *Millstone Grit* and shows, to a greater or less extent, in a very great number of places under the bluffs of this rock. The coal of this seam, as well as those of the other seams of the Plateau Region in Alabama, is of very variable thickness. It has been seen to bulge out to a thickness of 5 to 6 feet, and within a few feet of these thick pockets to be squeezed out to only a few inches in thickness. Similarly with the *Dade Seam,* (4) of the Etna Section, varies within a few feet from a thickness of about 14 feet down to about one foot. The thick *pockets* and *squeeze-outs* in these coals are most often due to sudden swells or sinks in the floors, or underbeds, though they are sometimes caused by the interpolation, thickening and thinning of shales in the roofs or covers. These coals are usually of good quality, but the quality varies with the locality. They are commonly very hard and solid and not very bituminous. Some of them are lamellar in structure, others are cubical. They frequently carry much sulphur or pyrites. They have never been worked to any very great extent in Alabama and only for home consumption, principally by the neighborhood blacksmiths, except in Jackson and DeKalb counties.

In the Coal Measures of the Plateau Region at and near some of the coal horizons, principally underbeds to the coals, there are seams of a light gray clay which on the out-crops are from one to six feet in thickness. These clays are often very fossilleferous with stem and leaf impressions; when dry they are very hard, but when thoroughly wet they are very plastic and are well suited for common pottery purposes as has been shown by actual use in many localities.

In these measures, there is also in certain localities much *clay ironstone* in regular stratified seams and interstratified layers of nodules. These measures also carry in places considerable *black-band ore.* These ores usually occur in the

Lower Measures, below the *Millstone Grit*, though occasionally they are seen in the *Upper Measures*. Near the base of these measures, there crops out in many places on the sides of the mountains a regular stratified seam of iron ore that sometimes reaches a thickness of four feet. This ore in the out-crops is a regular *limonite* though doubtless it changes within to a carbonate. On the sides of the mountains, below the out-crops of this ore and sometimes removed from them for one-fourth mile or more and mixed with debris from the conglomerates above the ore out-croppings are numerous deposits of limonite which have doubtless come from the out-croppings of the above seam of ore. Some of these deposits of limonite are of considerable extent. Most of it is of good quality, though some of it is sandy. In most of the deposits it is mixed with loose rocks, etc., and so it would be expensive to mine.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II. COUNTY DETAILS.

I. THE COAL MEASURES OF MADISON COUNTY.

The Coal Measures of Madison county are confined to the tops of the higher mountains in the eastern half of the county to the east of the Huntsville Meridian. These high mountains are nothing more than spurs and detached peaks of the western edge of the great table land of Tennessee or of the Cumberland Mountains. The detached peaks are connected together sometimes into mountain chains, sometimes into mountain groups and sometimes are isolated. The most prominent of these peaks have received distinct names. The spurs extend down from Tennessee. They occur along and near the Jackson county line in the north-east quarter of the county. The detached peaks in the mountain chains, etc., are to be found in the south-east quarter of the county. They extend as far west as the Huntsville mountain, Monte Sano. There are *little mountains* to the west of the Huntsville or Monte Sano mountain, but they do not have in or on them any Coal Measures. The Coal Measures of the Huntsville or Monte Sano chain of mountains are therefore the most western in Alabama north of the Tennessee River. The mountain chains and groups have spurs extending out from them with coves running up between these spurs and between the peaks. The mountains of this county are all due entirely to erosion and hence are mountains merely because the intervening parts have been washed away. The peculiar or remarkable features of these mountains are that they are flat, or have plateaus or level areas of table land on top that are bounded along the edges of the mountains by cliffs from 20 to 150 feet in perpendicular height. These level areas or Coal Meas-

ures are also scalloped and notched along the edges, and are sometimes cut entirely in two by deep coves extending up into them. They cover some 800 square miles in this county and are from 1000 to 1600 feet above the sea and from 400 to 1000 feet above the adjoining valleys.

The general description given in Introduction of the Coal Measures of the Plateau Region of Alabama will also answer for the Coal Measures of this county.

DETAILS.

The *Cliff Seam*, (5) of the Etna section, varies in this county from 0 to 2 feet in thickness and is the only seam of coal that is positively known to occur in the county. More or less traces of it can nearly always be found under the capping bluffs. The Huntsville or Monte Sano chain of mountains consists of high peaks, capped with Coal Measures, with gaps between these peaks. Over some of the gaps the Coal Measures have been entirely removed and the Mountain Lime stones are the surface rocks. Some of the high peaks have distinct names, as, Monte Sano, Round Top Mountain, Flat Mountain, etc. Monte Sano is the most northern and western peak of the Huntsville Mountain that is covered with Coal Measures; in fact, its Coal Measures are the most western in Alabama north of the Tennessee River. The mountain knobs, spurs and peaks farther to the north and west are made up of Mountain Limestone, with usually a capping of *LaGrange Sandstone* and a base of *St Louis Limestone*. The following is an approximate section of the strata of Monte Sano:

MONTE SANO SECTION.

(10) SANDSTONE (*Cliff Rock*); massive and ferruginous, 30 to 75 ft.
(9) *Shales, Sandstones*; The Shales are gray and the sandstones are shaly.
(8) COAL, (Cliff Seam, (5) of Etna Section); 0 to 1 ft. 6 in.
(7) *Shales*; argillaceous and fossiliferous, 2 to 10 ft.
(6) *Mountain Limestone*; fossiliferous, 300 to 400 ft.
(5) SANDSTONE (*LaGrange*); ferruginous and fossiliferous, 10 to 15 ft.
(4) *Limestone* (*Mt. Limestone*); blue, 0 to 10 ft.
(3) SANDSTONE (*LaGrange*); coarse grained, 0 to 10 ft.
(2) *Limestone* (*Mt. Limestone*); gray, 450 to 500 ft.
(1) *St Louis Limestone*, 75 to 125 ft.

On the west side of Monte Sano, there are some half-dozen old drifts in the outcroppings of the *Cliff Seam* of coal. At the mouths of two of these drifts, there occur the following sections:

SECTION AT DRIFT NO. 1, MONTE SANO.

(5) SANDSTONE (*Cliff Rock*); massive at botton, flaggy above, 30 ft.
(4) COAL, 0 to 0 ft. 5 in.
(3) *Sandstone*; shaly, 8 in.
(2) COAL; mining in blocks, full of pyrites, 1 ft. to 1 ft. 2 in.
(1) *Shale*; clayey, fossiliferous, visible, 2 ft. 10 in.

SECTION AT DRIFT NO. 2, MONTE SANO.

(6) SANDSTONE (*Cliff Rock*); ferruginous, slabby at top, then massive and then shaly, 30 ft.
(5) COAL, 0 ft. 2 in.
(4) *Sandstone* COAL; Sandstone, spongy and micaceous, with thin streaks of *Coal*, 3 in.
(3) *Shale*, COAL; shale, slaty, with thin streaks of *Coal*, 2 in.
(2) COAL; with much pyrites, 1 ft. to 1 ft. 2 in.
(1) *Shale*; very clayey, fossiliferous.

As will be observed from an inspection of the above sections, on Monte Sano the *Cliff Rock* is merely a sandstone. The coal of this peak appears to dip to the S W S., about 25 feet to the mile. Though it mines in large lumps and is hard, it soon crumbles on weathering from the large amount of pyrites that is in it.

One of the spurs of the Huntsville Mountain in S. 36, T. 3, R. 1 E, has about the following section:

SECTION OF MOUNTAIN SPUR IN S. 36, M. 3, R. 1 E.

(6) *Debris*; gradual slant to top, 15 ft.
(5) SANDSTONE (*Cliff Rock*), 20 ft.
(4) *Debris*; covering a bench, may cover some *Coal*, 20 ft.
(3) *Mountain Limestone*; Debris with one bench, 175 ft.
(2) *Sandstone* (*LaGrange*), 25 ft.
(1) *Mountain Limestone.*

In the upper part of (4), there is a deep shaft that has been sunk in search of silver. It was located by the *mineral rod.* The only metal discovered was pyrites.

The next high peak to the south of Monte Sano is known as the *Round Top Mountain.* Its Coal Measures are not connected with those of Monte Sano but are worn away over the gap between, along the Huntsville and Vienna pike. The coal of this peak, the *Cliff Seam*, is said to be of about the same thickness as in Monte Sano. The mountain in S. 10, T. 5, R. 1 E., has several benches along its side and is capped with a bluff (*Cliff Rock*) some 50 ft. high. Under this bluff, the *Cliff Seam* shows as several thin seams of coal of a few inches each in thickness.

The out croppings of *LaGrange Sandstone* on the sides of these mountains can be easily recognized from the valleys by the growth of pine over it with cedars growing up on the limestones above and below.

The mountain chain bordering on the Tennessee River between Flint and Paint Rock rivers is known as the *McKennie Mountain.* In it the *Cliff Seam* of coal is close on to 150 feet below the top of the mountain and is about 10 inches thick. This mountain down in the angle formed by the Tennessee and Paint Rock rivers juts up close to both of these rivers in the high bluff known as the *Flat Rock Bluff.* The top of this bluff is some 500 feet above the level of the rivers at its base. About 200 feet of this height is a perpendicular wall of the upper Mountain Limestones, above the LaGrange Sandstone. The LaGrange Sandstone is hid by the

debris at the foot of the bluff, and the Coal Measuers set in just above the bluff in a slant, and run up to a thickness of from 100 to 300 feet. The out-croppings of the coal of this mountain, the *Cliff Seam*, is said to be about 14 inches thick. This coal shows in several out croppings in the western part of S. 8, T. 6, 2 E. This mountain also has deep coves running up between its high peaks.

The mountain groups north of Vienna and south of the M. & C. R. R., and between Flint and Paint Rock rivers, form the *Keel Mountains*. These mountains are so cut up by deep coves and valleys as to have a very dissected appearance. Their higer peaks all contain more are less traces of the *Cliff Seam* of coal under the capping bluffs. The high mountain peak principally in S's 7 & 8, T. 5, R. 2 E., has on its sides several benches and on top the usual flat plateau. Some 40 feet under this plateau, under the capping bluff, the *Cliff Seam* of coal frequently shows itself, with sometimes a thickness of 18 inches. There is also found on this mountain a thin flagstone that makes a fine whetstone. The high peaks of the Keel Mountains in the northern and eastern parts of R. 2 E., and the western part of R. 3 E., both of T. 5, show in many places under the bluffs which cap them, out-crops of the *Cliff Seam* of coal, from 8 to 12 inches in thickness. In some of these peaks, at least, there is, some ten feet above the main coal horizon, with shales and sandstones between, another seam of coal about six inches thick, and some five feet higher, with shales and sandstones between, is still another seam of coal from three to twelve inches in thickness. This upper coal has partings of sandstone. From some of these coal out-crops issue bold springs of strong chalybeate waters.

The high mountains to the north of the M. & C. R. R. are connected with the great table land of Tennessee and hence are connected spurs of the Cumberland Mountains. These high mountain spurs are separated by deep coves and it is almost impossible to climb them from the coves, except by following up the water courses. They all have flat plateaus on top, and perpendicular bluffs around the crest of their edges.

The most southern point of these spurs in this county, in the N. E. corner of S. 1, T. 4, R. 2 E., has about the following section :

SECTION OF MOUNTAIN SPUR IN N. E. ¼ of S, 1. T. 4, R. 2 E

(8) SANDSTONE (*Cliff Rock*), 50 ft.
(7) COAL, 6 in., to 1 ft.
(6) *Debris*; sandstones and shales, 150 ft.
(5) *Debris*; calcareous rocks, 35 ft.
(4) *Mountain Limestone*, 75 ft.
(3) SANDSTONE (*LaGrange*); ferruginous, 15 ft.
(2) *Mountain Limestone*; massive, slabby, shaly, granular and argillaceous, 175 ft.
(1) *St. Louis Limestone*, 150 ft.

There are no pines on the sandy plateau of the above spur, the growth, strange to say, consisting of poplar, chestnut and oaks. Farther north on the side of this mountain spur, in E. ½ of N. W. ¼ of S. 31, T. 3, R. 3 E., there shows along the planes of stratification of the sandstones of the capping bluff (*Cliff Rock*) a seam of coal that varies in thickness from 0 to 12 inches. At this point the Mountain Limestone shows some 25 to 30 feet under the coal. In this limestone in S. 30, T. 3, R. 3 E., half a dozen or more caves have been cleaned out in search of two barrels of money reported, by an old Indian tale, to have been hidden somewhere in these mountains.

The *Cliff Seam* of coal under the capping bluff along near the county line is said to be in places in the western part of T. 3, R. 3 E., 18 inches thick and in places in the western part of T. 3 R. 3, E,. from 18 inches to 2 feet in thickness. The coal from these out-crops is used. On the side of the road leading down the mountain in S. 7, T. 2, R. 3 E., there is a thin out-cropping of coal of the *Cliff Seam* under the capping bluff. The intermediate seam of sandstone in the Mountain Limestone, or the *LaGrange Sandstone*, also shows along this road.

II. COAL MEASURES OF JACKSON COUNTY.

The Coal Measures of Jackson county, like those of Madison county, are confined to the tops of mountains, but then the mountains are much broader in this county. These mountains are nothing more than elevated table lands that have been cut and divided up by valleys of erosion. Those to the north of the M. & C. R. R. are still connected or continuous with the great table lands of Tennessee and are known as the *Cumberland table lands* or Cumberland Mountains. Those to the south of the above railroad and to the north of the Tennessee River, form the groups of mountain peaks known as *Gunter's Mountain.* Though they are now disconnected from each other and from the main table lands to the north of the above railroad, by coves and valleys of erosion, they were once but parts and parcels of the same great *table land of Tennessee.*

Those to the south and east of the Tennessee River, known as *Raccoon Mountain*, are nothing more than the extension into Alabama of the Walden Ridge or eastern edge of the table lands of Tennessee, cut in two by the Tennessee River. The plateau areas or Coal Measures of these mountains or of Jackson county were therefore once connected throughout and they formed the entire area of the county; but the Cumberland and Raccoon Mountain areas have, since their deposition, been separated by a fold of the strata, afterwards, eroded into the valley running north-east and south-west, and now occupied by the Tennessee river, and the Coal Measures on both sides of this valley have been so wasted away that they now, all together, do not cover quite half of the area of the county or as much as 500 square miles.

The boundary lines of these Coal Measures along the valleys, coves, etc., are distinctly marked by high abrupt bluffs

that cap the steep mountain sides. For a general description of these Coal Measures or the plateau region of Jackson county, see Introduction.

DETAILS.

A. COAL MEASURES OF THE CUMBERLAND MOUNTAINS.—On Dry Creek, one of the prongs of Larkins' Fork of Paint Rock River, in the southern part of T. 2, R. 3 E., and the northern part of T. 3, R. 3 E., something like the following section occurs:

SECTION IN T'S 2 AND 3, R. 3 E.

(6) COAL MEASURES; including Cliff Rock, etc., 50 to 80 feet.
(5) Coal, 1 to 2 feet.
(4) *Shale*, 2 to 10 feet.
(3) Mountain Limestone, 150 to 200 feet.
(2) *SANDSTONE (LaGrange);* fossiliferous, forming a bench, 10 to 20 feet.
(1) *Mountain Limestone;* to bed of creek, 150 to 175 feet.

This Dry Creek has its origin in two large sinks or two small coves, in a north and south line with each other, that together are from three to four miles in length. These sinks extend down into the sub-carboniferous limestones. Under the cross-ridge between the lower of these sinks and the head of Dry Creek, there is a subterranean lake, as can be seen back in the cave known as the *Mouth of the Sinks* or the head of Dry Creek.

In S. 29, T. 3, R. 3 E., there is along the plane of stratification of the *Cliff Rock* a seam of coal from 6 to 12 inches thick. This coal is in waves and in places appears to be squeezed out entirely. The *Cliff Rock* here forms a bluff about fifteen feet in height. On the side of one of the peaks of Keel Mountain, in the N. E. ¼ of S. 30, T. 4, R. 3 E., there occurs the following section:

SECTION OF KEEL MOUNTAIN IN THE N. E. ¼ OF S. 30, T. 4, R. 3 E.

(18) SANDSTONE; massive and slabby, corresponds to the *Upper Conglomerate*, bluff, 50 feet.
(17) *Shale;* clayey, visible, 3 to 4 feet.
(16) *Debris;* gradual slant, may hide coal, 10 to 15 feet.
(15) SANDSTONE (*Cliff Rock*), 30 feet.
(14) *Sandstone;* slabby with some clay iron stone, 3 to 4 feet.
(13) *Sandstone*, COAL; the sandstone is honey-combed and ferruginous, and contains the *coal* in thin seams from the fraction of an inch to two inches in thickness, 2 to 4 feet.
(12) COAL, *Sandstone;* the *coal* has thin partings of sandstone, 3 in. to 1 foot.
(11) *Sandstone*, 4 feet.
(10) *Shale;* ferruginous, 1 foot.
(9) COAL; with much pyrites, 6 in.
(8) *Sandstone*, 5 feet.
(7) *Shale*, COAL; the shale is clayey and carries thin seams of *Coal*, 4 feet.
(6) COAL; with much pyrites, 1 foot.
(5) *Shale*; clayey, just visible.
(4) *Debris;* bench with sink in upper part, 50 feet.
(3) *Mountain Limestone*, 60 feet.
(2) *SANDSTONE (LaGrange);* bench, 25 feet.
(1) *Mountain Limestone and St. Louis Limestone*, to foot of mountain, about 800 feet.

From the lower part of the Sandstone (18), there flows, at Dr. Blair's summer residence on the top of this mountain, a bold stream of very cool and strong chalybeate water. At this spring, some thin seams of coal show in the lower part of (18).

On *Split Rock Mountain*, in S's 3 and 10, T. 5, R. 3 E., the *Cliff Seam* of coal crops out in several places 18 inches thick. The *LaGrange Sandstone* forms a bench on the side of this mountain.

On the side of the mountain, in the south-east part of T. 4, R. 3 E., the *Cliff Rock* forms a capping bluff of from 40 to 60 feet in height. The *Cliff Seam* of coal shows itself under this bluff in many places. It is also said to crop out about 12 inches thick, at intervals, for five to six miles to the north-east of this locality, under the capping bluff (*Cliff Rock*) of the south-east edge of the mountain.

The *Belmont Coal Mines*, in S. 1, T. 4, R. 5 E., are in this *Cliff Seam* of coal. At the time visited, in September, 1880, these mines are said to have consisted of nine drifts. These drifts are arranged along under the capping bluff (*Cliff Rock*) on the south east side of the mountain. They are about 75 feet under the top of the mountain and some 850 feet above the M. & C. R. R., at Limrock or Boyd's Switch about four miles distant. The mouths of these drifts are some 10 feet above a bench along which, in front of the drifts, runs a narrow gauge railroad, some 2½ miles long, to the drum at the head of the incline. The incline is said to be 200 feet long and to have a fall of 500 feet. It ends in a chute over a standard gauge branch railroad out from Limrock or Boyd's Switch. The coal in these drifts is said to range in thickness from 16 inches to 4 feet.

It has near the bottom a parting of fire clay that sometimes gets to be as thick as 3 inches. The mining of this coal in 1880 is said to have cost about $1.00 per ton and that it took about 25 cents extra to get it to market.

Col. J. B. Killebrew of Tennessee, in his special report on the Belmont Coal Mines, in 1878, gives the following as probably a section of the mountain at these mines:

SECTION AT BELMONT COAL MINES IN S. 1, T. 4, R. 5 E.

(9) CLIFF ROCK; estmated, 70 ft.
(8) COAL (*Cliff Seam*), 4 ft.
(7) *Fire Clay*, 4 ft.
(6) *Shales Sandstones*; with probably one or more seams of *Coal* 200 ft.
(5) *Fire Cluy*, COAL, 1 to 3 ft.
(4) *Heavy bedded sandstone*, 25 ft.
(3) *Sandstone*; concretionary, 12 ft.
(2) *Mountain Limestone*, 500 ft.
(1) *St. Louis Limestone*, 100 ft.

The *Cliff Rock* (9), here a hard, massive sandstone, forms a bluff about 40 feet high over the drifts. From the edge of the bluff there is a slant to the top of the mountain of about 35 feet more. In places, at least, there is just under the *Coal* (8) a hard flinty sand stone and just over the coal the

sandstone for several feet is black and shaly. The shale or fire clay underbed is very siliceous. On the side of the mountain, over the Mountain Limestone (2) there are two benches which very probably cover out-crops of the *LaGrange Sandstone.*

Col. Killebrew, in the above special report, says: "The main entry has been made on the south-eastern side of the mountain and is driven in N. 70 W., to the distance of 155 feet. At the out crop on the brow of the mountain the seam is 4 feet 4 inches thick. The coal is very hard and cubical, lamellar, semi lustrous, free from pyrite, and has no superior as a shipping coal, in Alabama or any other state. It is no exaggeration to say that a house might be built out of the brick like forms of this coal, which would resist the erosive action of the weather for an ordinary lifetime. This power of the coal to resist the disintegrating influences of the weather manifests itself along the out crops of the seam as at the foot of the Cliff Rock, where it remains hard and compact, though exposed for long ages to the crumbling influences of frost and rain. In point of hardness it is a very remarkable coal. Prof. Lupton asserts that it is the hardest coal that he has ever analyzed. It burns with a cheerful blaze and emits radiant gas jets, which suggests the possibility of its value for making gas.

"At the distance of 90 feet from the mouth of this entry, there is a swell or roll in the botton of the mine without a corresponding one at the top. This swell pinches the coal down to 3 feet. After passing this short swell or wave, the coal begins to thicken, so that at 155 feet, the distance to which the entry has been driven, it is 39 inches thick with a tendency to an increased thickness as the gangway is extended.

"The gangway is not entirely horizontal, but has an incline upward, at the rate of about 3 feet in 100 feet, thus securing a natural and inexpensive drainage to the mine. Probably this inclination would be more than enough to answer the purpose of drainage; if so, the gangway might be driven into the right or left, so as to secure any inclination

desired. It is quite probable, however, that after going in 200 feet, the seam will become perfectly horizontal, as it not unfrequently happens that the breaking down of the strata on the slopes of the mountain gives an ascending inclination to the beds of coal at the out-crop.

"In this seam there is a parting of fire clay two inches thick, which occurs thirty-five inches from the roof, and remains parallel to it. Below this fire-clay is a layer of hard cubical coal, which splits into square blocks. This parting of fire-clay proves of great advantage in mining, and renders the use of blasting powder unnecessary. The fire-clay being soft and of a putty-like consistency, is picked out, and the upper and lower layers of coal broken by wedges driven in at the top of the roof, and from the bottom. This method of mining is greatly preferable to blasting, in as much as all the coal comes out in large blocks, and there is comparatively little fine coal.

"After having carefully examined more than 100 coal mines, I can state with the strictest regard to truth, that I have never seen a seam of coal with the same hardness that can be mined so economically, and with such little waste of coal. This seam of fire-clay, so far from being a disadvantage, is of immense value in the economical production of coal.

"The top of the mine consists of layers of shaly sandstone, very hard, and not at all likely to prove troublesome. It shows a smooth, even, hard surface, making what miners call a "*good roof*."

"Beneath the coal is a very hard fire-clay, grayish in color, highly siliceous, difficult to pick, and giving out a ringing metallic sound when struck. It is smooth, except where the swell or wave spoken of occurs. This wave seems to have been shot up into the coal when in a semi-fluid condition, without disturbing in the least the lamination. In examining the coal on the sides of the gangway, I was struck with the almost perfect horizontality of the lamination, and the absence of all plications or "horsebacks." No contortion of laminal was anywhere seen, though, there are occasional

vertical cleavage planes, which give the cubical character to the coal.

"Taking the direction in which the gangway has been extended, it can be carried a mile and a half before it would come to light in a deep gorge on the opposite slope of the mountain. Were it continued in a south-westerly direction, the entry could be driven for several miles through coal. In a north-westerly direction it would meet with no considerable gash in the mountain until it encountered the deep valley of Big Coon Creek, twenty miles distant. Here then is a body of coal covering about thirty square miles, persistent and almost without a break to interfere with mining operations. There are at least two, if not three workable seams. The perfect regularity of the stratification on the sides of the mountain, and the general evenness of the surface on top, lead me to think that no serious plications or strati graphical dislocations will be met with in working the mines.

"Nor does this opinion rest alone upon inferences deducible from the geological indications of the location, but upon facts derived from other explorations. To a practical geologist these additional explorations are conclusive of the fact that no serious faults or disturbances need be expected. Two hundred yards north-east of the entry already described, the seam at the same elevation is exposed forty-six inches thick, with two inches of fire-clay parting. Farther on, one hundred yards, the seam shows fifty-one inches with a fire-clay parting of three inches. Keeping along the south-eastern face of the mountain, 150 yards farther to the north-east, there are seen forty-four inches of coal, and three inches of fire-clay parting. At this opening the fire-clay at the bottom is more distinctly seen, being of a dirty gray color, and very hard after passing the out-crop.

"These openings clearly indicate a remarkable uniformity and persistency in the thickness of the seam, and in the quality of the coal. A mile farther to the north-east the out-crop is said to be five feet thick. It is quite probable that the seam thickens going north, and grows some thinner

towards the south, for an excavation half a mile south-west of the first entry described shows only three feet of coal.

"The general aspects and character of the coal have been mentioned. A fair specimen of this mine was submitted to Dr. N. T. Lupton, of the Vanderbilt University, for analysis. The following is the result:

Moisture	0.91
Ash	4.53
Volatile Matter	39.67
Fixed Carbon	54.89
	100.00

"Prof. Lupton remarks that this coal is of *excellent quality*, very dry, firm and hard, and contains a large percentage of volatile matter, which renders it in all probability eminently suitable for the manufacture of gas. The specimen analyzed showed an entire absence of sulphur or any other hurtful ingredient."

"Mr. Jno. A. Grant, the Supt. of the M. & C. R. R., in a letter written to Mr. F. D. Hurt, of Boyd's Switch, dated Oct. 27, 1877, says:

"I have had the coal from your mine (Belmont) tested as to its adaptability to locomotives, and am pleased to be able to certify to its superiority to any now in use on this road."

In a letter written to the same gentleman by Mr. D. Bryant, of Memphis, he says:

" Some of the mechanics at the shops here (M. & C. R. R.) have seen some of the coal you shipped here, and have asked me to write you, to know if there is any possible chance to get some, say three car-loads, at Boyd's Switch on cars, and at what price. They say it is as good as Pittsburg coal."

Across the mountain, in a northerly direction from this mine, on the south-east side of the gorge of Guess Creek, the *Cliff Seam* is said to be about 3 feet thick on the out-crop and about 7 feet lower than at the mouth of the above mine. On the opposite or north-west side of this gorge in "Phillips Hollow," the same seam of coal is said to be 4 feet thick and to have some 7 feet of *black band ore* over it. This last

out-cropping is most probably of the same locality as the out-cropping of the following section, in the S. E. ¼ of S. W. ¼ of S. 22, T. 2, R. 5 E., obtained from a reliable source:

BLACK-BAND OUT-CROPPING IN THE S. E. ¼ OF S. W. ¼ OF S. 22, T. 2, R. 5 E.

(6) *Sandstone;* roof.
(5) *BLACK-BAND*, 4 ft. 11 in.
(4) COAL *and Slate*, 4 in.
(3) *BLACK-BAND;* slaty, 1 ft. 7 in.
(2) *Sandstone*, 5 ft. 5 in.
(1) *Limestone.*

The above *black-band* (5) is reported to carry about 32 per cent of metallic iron, and is believed to be of the same horizontal position as the Belmont Coal or the *Cliff Seam*, (5) of the Etna Section.

The same authority gives the following as sections of this same *Cliff Seam* of coal in the S. E. ¼ of N. E. ¼ of S. 12, T. 2, R. 4 E.

FIRST, AT MOUTH OF ENTRY.

(5) *Sandstone;* roof.
(4) COAL; dull and lustrous, and quite hard and constant in thickness, 2 ft. 2 in.
(3) *Slate*, 2 in.
(2) COAL; brighter and softer than (4), contains much pyrites and is very variable in thickness, 1 ft. 1 in.
(1) *Sandstone*; ferruginous.

SECOND, FIFTEEN FEET WITHIN, FROM MOUTH OF ENTRY.

(3) COAL, 1 ft. 2 in.
(2) *Slate*, 4 in.
(1) COAL, 1 ft. 1 in.

THIRD, TWENTY FEET NORTH OF MOUTH OF ENTRY, UNDER SHELVING ROCK.

COAL, 1 ft. 11 in.
Slate, 2 in.
COAL, 1 ft. 1 in.

In S. 8, T. 2, R. 4 E., on a *bench* formed by the *LaGrange Sandstone* on the side of the mountain, over 100 feet below the *Cliff Rock*, are to be found some fossil coal plants (*Lepidodendrous*), distinctly marked.

In S. 33, T. 1, R. 5 E., there are some out-croppings of the *Cliff Seam* of coal about 18 inches in thickness. This seam of coal shows also in S. 15, T. 1, R. 5 E., and in S's 5 and 10, T. 2, R. 6 E.

"*Poor House Mountain*" in S. 14, T. 3, R. 6 E., has about the following section:

SECTION OF POOR HOUSE MOUNTAIN IN S. 14, T. 3, R. 6 E.

(14) SANDSTONE, CONGLOMERATE (*Cliff Rock*), 25 to 35 ft.
(13) *Sandstone;* honey-combed, ferruginous and containing streaks of clay iron-stone, 0 to 3 ft.
(12) COAL; waving, 0 to 1 ft.
(11) *Sandstone;* flaggy, hard and cherty looking, 10 to 15 ft.
(10) *Shale;* blue and sandy, with much pyrites and thin seams of clay iron-stone, 3 to 6 ft.
(9) *Sandstone;* very hard and very fine grained; bluish, flinty and calcareous, 1 ft.
(8) *Shale;* sandy, blue and green, with much pyrites, 10 to 30 ft.
(7) *Sandstone;* hard and ferruginous, 1½ ft.
(6) *Sandstone;* flinty and calcareous, ⅓ ft.
(5) *Shale;* yellow with calcareous streaks, 4 ft.
(4) *Limestone;* Mountain Limestone, 75 to 80 ft.
(3) SANDSTONE (*LaGrange*), bench, 20 ft.
(2) *Mountain Limestone*, 200 ft.
(1) *St. Louis Limestone*, 15 ft.

The *Cliff Rock*, (14) of the above section, is here in waves and has in it in places, seams of falsely bedded strata. There are also under the bluffs of this rock numerous rock-houses, that have been worn back in the softer rocks, or in the shaly and flaggy rocks, and are covered with the hard massive rocks. The flagstones (11) of the above section are sometimes of excellent quality and have been quarried and shipped in small quantity. In (8) to (10), inclusive, of the above section, there are several pits or shafts that are known as the *Gallatt gold mines*. They were dug for the *fool's gold* which abounds in these rocks. There also occur some fine springs

along the foot of the *Cliff Rock* bluff of this mountain. There are no pines on the sandy plateau of this mountain, the growth consisting principally of hickory, oak and chestnut.

There are some pines however over the bench on the side of the mountain, and along the foot of the mountain are some noble white oak trees of five feet in diameter.

Under the capping bluff (*cliff rock*) in S. 6, T. 3, R. 7 E., are some thin out-croppings of coal, and a short distance north of Stevenson this *Cliff Seam* is said to be 3 feet in thickness. North of old Boliver, it shows in many places, under the capping bluff, from one to two feet in thickness. In an outcropping in the S. E. ¼ of S. 29, T. 1, R. 8 E., it is said to be about 25 inches thick. At this point it was drifted into and worked for a short time just previous to the war by the "Huntsville Mining and Manufacturing Company." The coal was carried on a tramway to the M. & C. R. R. at Boliver. Prof. Safford gives the following as a section of the Coal Measures at the margin of the table land near Anderson Depot, on the N. & C. R. R:

(12) CONGLOMERATE; coming in back of the top oft he cliff formed by the sandstone below.
(11) COAL, *and Shale*; coal, so far as seen, only eight or ten inches thick, 40 ft.
(10) SANDSTONE; heavy, makes the *cliff*, thickness (estimated) 120 ft.
(9) COAL; from 2 to 5 feet of lustrous, black, good coal, more or less laminated by thin leaves of mineral charcoal, contains some pyrite occasionally in seams. Several hundred bushels have been taken from the banks at this point. The coal will, perhaps, average, 3 ft.
(8) *Fire Clay*, 3 ft.
(7) *Shale*, 8 ft.
(6) *Sandstone*, 10 ft.
(5) COAL ; *and Shale* 10 ft.
(4) *Sandstone and Sandy Shale*, 55 ft.
(3) *Shale*, 1 to 6 ft.
(2) COAL; has been opened, a laminated, cubic coal, without pyrite, will average, so far as seen, from 2½ to 3 ft.
(1) *Shale*; with clay iron stones, followed below by rocks not seen.

South of the above section, near the State line, the *Cliff Seam* of coal, (9) of the above section, shows in the four out-croppings as in the following sections:

FIRST OR MOST NORTHERN OUT-CROP.

(4) SANDSTONES (*Cliff Rock*); massive above and flaggy below; the flagstones stuck in bluff as if by hand, 120 to 130 ft.
(3) *Shale*, 2½ ft.
(2) COAL; lamellar structure, 1¼ ft.
(1) *Shale*; clayey, with much iron, visible, 4ft.

SECOND OUT-CROP.

(5) SANDSTONE, (*Cliff Rock*); massive bluff, 25 ft.
(4) *Flagstone*, 15 ft.
(3) *Clay Iron-stone*; Sandy and spongy, ⅔ ft,
(2) COAL; lamellar structure, 3 ft.
(1) *Shale*; clayey, with much iron ore, visible, 4 ft.

THIRD OUT-CROP.

(5) SANDSONE *Cliff Rock*; massive, bluff, 30 ft.
(4) *Sandstones*; flaggy and loose in bluff as if packed in by hand, contain much spongy iron ore, 6 to 8 ft.
(3) *Shale*; has much limonite on surface, 3 ft.
(2) COAL; lamellar structure, 1 5-6 ft.
(1) SLATY COAL; just visible.

FOURTH OR MOST SOUTHERN OUT-CROP.

(4) SANDSTONE (*Cliff Rock*); little slabby near bottom, bluff, 50 to 60 ft.
(3) *Sandstone*; ferruginous, little shaly in places, 2½ ft.
(2) COAL; with thin seams of mineral charcoal and much pyrites, lamellar structure, ⅔ ft.
(1) *Shale*; full of coal plants.

The principal growth of the sandy plateau on top of the mountain in this neighborhood is chestnut and chestnut oaks with a few dwarf short leaf pines.

Across the mountain, east of the above sections, on the margin of *Doran's Cove*, near the State line, in the south-west corner of Marion County, Tennessee, there occurs the following out-cropping:

SECTION NEAR THE STATE LINE, IN THE SOUTH-WEST CORNER OF MARION COUNTY, TENNESSEE.

(12) *Coal Measures, Debris*; containing the *Cliff Rock* and doubtless more or less *coal*, 150 ft.
(11) *Sandstone*; flaggy and shaly, 3 ft. 6 in.
(10) *Shale*; sandy and ferruginous, 3 in.
(9) *Clay*, 4 in.
(8) COAL; shaly, 1 in.
(7) *Clay Ironstone*, 1½ in.
(6) *Shale*; sandy ferruginous, 1½ in.
(5) *Clay Ironstone*, 1½ in.
(4) COAL; dull black color, lamellar structure, and contains much pyrites and nodules of a sandy clay iron-stone and and thin irregular streaks of clay; visible 9 feet, said to be 12 ft. 6 in.
(3) *Debris*, 15 ft.
(2) *Coal Measures, Debris*; may have *coal*, 150 to 175 ft.
(1) *Limestone.*

A short distance west of the coal out-cropping of the last section, this same coal shows to a thickness of about 3 feet. This coal is believed to be of the same seam as (4) of the *Etna Section* and (5) of Dr. Safford's section near Anderson's Depot. The seam is very variable in thickness and has thick pockets of coal that in very short distances are squeezed out to nothing.

Just over the ridge or spur, to the north-east of the coal out-cropping of the last section and apparently of about the same altitude, there shows:

(4) *Sandstone*; massive, bluff, 20 ft.
(3) *Clay, Sandstone*. 6 in.
(2) COAL, 8 in.
(1) *Clay*; visible to a depth of several inches.

The *coal* (2) seems to be supplanted in places by shale. In another place on this north-east side of the spur, there shows:

(3) *Sandstone*; massive, bluff, 20 ft.
(2) *Shaly Sandstone*, 6 in.
(1) COAL; weathering into a clayey shaly looking stuff, visible to a thickness of 3 ft., said to have been dug into, 4 ft.

The coals of the last three sections are probably of the same variable seam, (4) *of the Etna Section.* The out-cropping of coal in "*Bedstead Hollow*," one of the hollows leading down into the head of Doran's Cove, are believed to be also of this same seam. The out-cropping of coal on the north side of "Bedstead Hollow" is said to be 3 feet 6 inches thick; that on the south side of the hollow is in the back part of a rock-house, in which there was, in November, 1883, an old furnace and the remnants of what is said to have been an old *scaffold bedstead*, hence the name *Bedstead Hollow.* The old furnace is built of flagstones from the back part of the rock-house and is said to have been here for from 70 to 75 years. The supposition is that a counterfeiter here once mined his coal, made his spurious money and slept. The coal has a lamellar structure and often carries much pyrites. The flagstones of this neighborhood are often well suited for grindstones and whetstones, and are used for headstones to graves.

The dividing ridge between Doran's Cove and Jefferies' Cove, a small cove running out from the main Doran's Cove towards the north-west, in what is known as *The Narrows*, has been worn down to the mere thickness of the *Cliff Rock.* Across *The Narrows* the Cliff Rock forms a wall some 60 feet long by some 15 feet high and only 2 to 3 feet thick. The approach to *The Narrows* from either end of the spur is, for a long way, not more than wide enough for a wagon-way, with a bluff on each side. This spur appears to be made up as follows:

(4) *Coal Measures*, 350 to 400 ft.
(3) *Mountain Limestone*, 90 to 100 ft.
(2) *LaGrange Sandstone*, 25 to 30 ft.
(1) *Mountain Limestone*, 125 to 130 ft.

The steep sides of the above spur have been stripped of many fine trees of black walnut and chestnut oak.

Near and at the heads of the numerous small coves and hollows running down into Doran's Cove are to be seen many high and beautiful water falls and many huge sinks

and caves that frequently lead down to subterranean streams. These subterranean streams frequently make their appearance at the surface. to flow above ground for only a short distance when they again disappear to come to light again perhaps miles off.

On the high mountain peak or spur between Doran's Cove on the south-west and King's Cove on the north-east, there is said to be out-croppings of coal from 18 to 30 inches in thickness. On the side of the mountain between the State line and South Pittsburg, Tenn., a seam of coal shows in many places 3 feet in thickness. The Coal Measures capping the mountain spur near South Pittsburg have something like the following section:

SOUTH PITTSBURG SECTION.

(9) *Conglomerate* (Upper); scattered over the top of mountain back from edge of bluff.
(8) *Sandstone, Debris;* including the *Cliff Rock* and perhaps some *coal*, about, 150 ft.
(7) COAL (*Battle Creek Seam, Cliff Seam*), 1 ft. 6 in. to 2 ft. 2 in.
(6) *Clayey Shale;* very fossiliferous.
(5) *Sandstone*, 25 to 30 ft.
(4) *Clayey Shale*, 2 to 3 in.
(3) COAL; soft on out-crop, with some clayey partings 2 ft. 6 in.
(2) *Clayey Shale;* just visible.
(1) *Debris, Sandstone;* may hide some *coal*, about 100 ft.

The Coal (3) of the above section corresponds to the thick irregular coal of the hollows around the head of Doran's Cove or to (4) of the Etna Section. In one of its out-crops in the above mountain spur near South Pittsburg, it has the following detailed section:

(3) *Sandstone;* slabby, 25 ft.
(2) COAL, 3 in.
Sandstone, shaly, 6 in.
COAL, 3 in.
Shale, 1½ in.
Sandstone; shaly, 10 in.
COAL, 2 ft. 6 in.
(1) *Clayey shale;* fossiliferous.

B. Coal Measures of Raccoon Mountain.—The Coal Measures of Raccoon Mountain to the east and south of the Tennessee River are similar in a great measure to those of the Cumberland Mountains. At the *Dade or Cole City Mines*, Georgia, on the margin of the mountain east of Nickajack Creek, the Coal Measures have the following section:

DADE SECTION.

(12) Sandstone (*Cliff Rock Lower Conglomerate*) 75 ft.
(11) COAL (*Cliff Seam*), 6 in. to 2 ft.
(10) *Shale*, 50 ft.
(9) COAL (Dade or Cole City Seam), 1 ft. to 17 ft.
(8) *Shale, Clay*, 45 ft.
(7) COAL (*Red Ash Seam*), 6 in. to 3 ft.
(6) *Fire Clay*, 6 ft.
(5) *Sandstone*, 20 ft.
(4) COAL, 1 ft.
(3) *Sandstone, shale*, 80 ft.
(2) COAL, 10 in. to 1 ft. 2 in.
(1) *Shale*, 40 ft.
Limestone.

The Coal worked at these mines, (9) of the above section, the *Dade or Cole City Seam*, corresponds to the thick irregular coal of the hollows around the head of Doran's Cove or to (4) of Etna Section. It is in the Dade Mines very irregular, ranging in thickness from 1 to 17 feet. The thick pockets of coal do not appear to be in any regular order, though they doubtless occupy the troughs of waves in the underbed strata. It was noticed, in these mines, that the thick pockets of coal had both a shale cover and a shale underbed, while the squeezed out portions of the seam were between sandstones. This shale is black, slick and oily. It divides or splits easily and crumbles badly on weathering, it therefore forms a dangerous or *bad roof* and makes the mining of these thick coal pockets expensive from the necessary use of much propping. This coal is also expensive to mine from the fact that the ridges or waves in the underbed, which cut off or squeeze out the coal, frequently rise so suddenly or are so steep that the coal cars can't be pulled up or over them, and hence to get the coal of the thick pockets beyond these

ridges or crests of waves a great deal of *dead work* has to be done in tunneling through the hard strata of the ridges or waves. The coal is of good quality; its lamellar structure in the thick pockets is often destroyed by knotty looking places.

Wast of the Dade or Cole City Mines, near the Alabama line, on the edge of the mountain on the south side of the west prong of Nickajack Creek, are the *Castle Rock Mines.* On the side of the mountain at the Castle Rock Mines, there shows something like the following section:

CASTLE ROCK SECTION.

(10) CONGLOMERATE, (*Millstone Grit, Cliff Rock*); 50 ft.
(9) COAL (*Castle Rock Seam, Cliff Seam*), 3 ft.
(8) *Shales*, COAL; the *Coal* in thin sheets in shale, 1 ft. 6 in.
(7) *Sandstone*, 20 ft.
(6) COAL (*Dade Seam*), 1 in. to 1 ft. 6 in.
(5) *Debris;* it likely covers some *coal*, 50 ft.
(4) *Sandstone*, 75 ft.
(3) COAL, 2 ft. 6 in. to 3 ft.
(2) *Coal Measures, Debris*; believed to contain one are more coal seams, 250 ft.
(1) *Mountain Limestone.*

A detailed section of the *Castle Rock Seam,* (9)of the above section, on the out-crop at the mouth of the Drift is as follows:

(7) CONLOMERATE (*Cliff Rock*); the lower 20 feet is here a massive yellow sandstone, 50 ft.
(6) COAL, 8 in.
(5) *Slate*, 2 in.
(4) COAL, 2 ft. 6 in.
(3) *Slate*, ½ to 1 in.
(2) COAL, 10 in.
(1) *Shale*, COAL; coal in thin sheets in Shale, 1 ft. to 1 ft. 6 in.

This coal is also irregular in thickness, from bulges or swells both in the floor and roof and from the interpolation of shale just over the coal seam. The thick coal is however seemingly along in troughs in the underbed, running almost north and south, separated from each other by ridges or

crests of waves. The dip is towards the south. The coal in the bed is very hard and hence hard to mine. It comes out in lumps.

On the side of the Bridgeport and Trenton road down the mountain in the Moore Gap, in S. 14, T. 1, R. 9 E., there is an old drift in the out-cropping of a seam of coal. Under the capping bluff (*Cliff Rock*) to the south-west of the Moore Gap or in the S. E. ¼ of S. 22, T. 1, R. 9 E., there are reported out-croppings of coal about 12 inches thick.

At the mouth of the *Cunningham Old Drift*, in the S. E. corner of S. 27, T. 1, R. 9 E., there is the following section:

CUNNINGHAM SECTION.

(5) CONGLOMERATE (*Cliff Rock, Millstone Grit*), 60 ft.
(4) COAL, 3 in.
(3) *Slate*, 1½ in.
(2) COAL, 1 ft. 4 in. to 2 ft.
(1) *Shale;* visible, 2 ft.

This drift was worked before the war; it is said to be driven for one-fourth mile, and the coal in it to be from a few inches to four feet in thickness. The coal was hauled in wagons down the mountain to the river and loaded on flat-boats. Most of it is said to have been lost in the Tennessee River at the head of Muscle Shoals. It is said to show in many of its out-crops throughout this section of country about three feet in thickness. In this neighborhood, on the plateau north of Long Island Creek, there is said to be out-croppings of a seam of coal over the Cliff Rock or Lower Conglomerate, that sometimes reaches a thickness of 2 feet 6 inches. It is probably the *Sewanee Seam*, (6) of Etna Section.

Along Long Island Creek, the Cliff Rock is near 100 feet in thickness. It forms water-falls along the branches or headwaters of this creek in their descent from the plateau or top of the mountain. Under these water-falls, in several instances at least, are out-croppings of the *Cliff Seam of Coal*. On the side of the mountain south of Long Island Creek, in S. W. ¼ of S. 10, T. 2, R. 9 E, there is a reported

out cropping of coal 12 inches thick; it is probably the *Cliff Seam.*

The *Cliff Seam* shows in several places under the capping bluff (*Cliff Rock*) along the edge of the mountain next to the river below Long Island Creek. The coal in these out-croppings is said to range from one to seven feet in thickness. It was worked in *ante bellum* days, in S. 9, T. 2, R. 8 E., in what is known as the *Caperton or Gibson Mines.* The coal from these mines was hauled in wagons down the mountain to the river, loaded on flat-boats and shipped to Chattanooga, etc. The coal of this neighborhood, or on Raccoon Mountain between Long Island and Raccoon creeks, has the reputation of being thicker than in any other locality on this mountain. In the *Pennington well,* several hundred yards south of the gulch of Long Island creek and a couple of miles from the mouth of this creek, the coal is between three and four feet in thickness.

In S. 16, T. 2, R. 9 E., there is a reported coal out-cropping four feet thick, and in this locality there are said to be several out-croppings of coal away from the edges of the mountain, in some of which the coal is two feet and over in thickness. These out-croppings of coal we refer to are of the same seam as the coal in the Pennington well which is most probably the *Sewanee Seam,* (6) of Etna Section. On top of the mountain, near the DeKalb line, in T. 3, R. 9 E., there are several out-croppings of coal from six to eighteen inches in thickness. These out-croppings of coal are some 50 feet over the Lower Conglomerate and hence are also probably of the Sewanee Seam. Coal is said to crop out in S's 1 and 12, T. 3, R. 8 E., which is more than probably of the same seam. The growth over the top of the mountain hereabouts consists principally of blackjack oaks, post and red oaks, with some pines, hickories, chestnut, etc.

Along Rocky Branch, in the S. E. ¼ of S. 4, T. 4, R. 8 E., we find the following section:

ROCKY BRANCH SECTION.

(18) CONGLOMERATE (Upper); scattered over surface.
(17) *Sandstone, debris;* 30 ft.
(16) *Sandstone*, COAL; the sandstone is shaly and carries thin, irregular seams of *coal*, 4 in.
(15) *Clayey shale, clay;* 2 ft.
(14) COAL (*Armstrong Bank*), 8 in. to 1 ft.
(13) *Clay;* fossiliferous, 1 ft.
(12) *Debris;* likely sandy shale, 15 ft.
(11) *Shale;* sandy, visible, 4 ft.
(10) *Sandstone*, COAL; the sandstone is shaly and carries the coal in thin seams, 1 ft. 6 in.
(9) COAL (Sewanee), 4 in. to 10 in.
(8) *Clay;* fossiliferous, just visible.
(7) *Debris;* likely sandy shale, 30 to 40 ft.
(6) CONGLOMERATE (*Cliff Rock, Millstone Grit*); flaggy near top, 80 to 100 ft.
(5) COAL, 4 to 6 in.
(4) *Slate*, 1 to 2 in.
(3) COAL; poor, containing much pyrites. visible above water, 1 ft. 3 in.
(2) COAL, *Slate;* felt under water to bottom of hole, 6 in.
(1) *Debris.*

The *Cliff Seam*, (2) to (5) inclusive, of the above section crops out in the back part of a rock-house, under a clear water-fall of some 30 feet.

The strata in many places in the creeks on the mountains, in this vicinity, are seen to be in waves, usually from north-west to south-east, and carry falsely bedded seams. Scattered along the road leading down into Jones' Cove, in N. E. ¼ of S. 28, T. 4, R. 7 E., there is considerable limonite. Some of the boulders of this ore are several feet in diameter. It doubtless comes from the out-croppings of a seam near the base of the Coal Measures. Jones' Creek on the mountain is called Bryant's Creek and is put down on the maps as Riley's Creek. On the south side of the gorge of Jones' Creek, there are many out-croppings, under the capping bluff, of the *Cliff Seam* of coal, 18 inches in thickness. On the mountain in S. 26, T. 4, R. 7 E., there are out-croppings of coal which are likely of the Sewanee Seam. The growth on the mountain here consists of a few hickories with spots

of white and post oaks and spots of pine. The pasturage is very fine indeed during the summer months. Crossing the road up the mountain from Hitch's Ferry, in the N. W. ¼ of S. 31, T. 4, R. 7 E., about half-way up the mountain, in the Mountain Limestone, is a seam about six inches thick of very impure hard cubical slaty coal.

On the mountain, at the *Stoner Coal Bed*, in the S. W. ¼ of S. W. ¼ of S. 32, T. 4, R. 7 E., there is the following section:

STONER SECTION.

(9) *Debris;* loose Conglomerates, etc., to level of plateau, 20 ft.
(8) CONGLOMERATE (*Upper*), 20 ft.
(7) *Flagstones, Debris,* 10 ft.
(6) COAL (*Sewanee*); at chalybeate spring, 6 in.
(5) *Clayey Shale;* fossiliferous, 4 ft.
(4) *Sandstone;* massive, reddish, 15 ft.
(3) CONGLOMERATE (*Cliff Rock*), 60 to 75 ft.
(2) *Sandstone, Shale,* COAL; the sandstone and shale carry the coal in thin streaks, 1 ft. 6 in.
(1) *Debris.*

There is said to be other out-croppings of coal similar to the above in this locality. On the top of the mountain, not far from the edge, in N. W. ¼ of S. 1, T. 5, R. 6 E., there is a large pond or sink, an usual sight.

At Fern Cliff P. O. on the brow of the mountain in the N. W. ¼ of N. W. ¼ of S. 12, T. 5, R. 6 E., there is the following out-cropping:

FERN CLIFF SECTION.

(11) *Debris;* loose Conglomerates, etc., to top of mountain, 15 ft.
(10) CONGLOMERATE (*Upper*), 15 ft.
(9) *Debris,* 25 ft.
(8) COAL (Sewanee); said to be several feet thick, visible to a thickness of 1 ft. 3 in.
(7) *Clay;* just visible.
(6) *Debris;* likely clayey shale, 4 ft.
(5) *Sandstone;* massive, reddish, 18 ft.
(4) CONGLOMERATE (*Cliff Rock*), 30 ft.
(3) *Debris;* doubtless hides *Cliff Seam,* 20 ft.
(2) *Sandstone,* 15 ft.
(1) *Debris.*

In the above section, the *Cliff Seam* does not show itself, though there runs from out of the debris just under the Conglomerate (4) a chalybeate spring which doubtless has its origin in this seam of coal. The *Cliff Seam* shows just south of the above locality under the "*Durham Bluff*," as follows:

DURHAM BLUFF SECTION, No. 1.

(4) CONGLOMERATE (*Cliff Rock*), 60 ft.
(3) COAL; with much pyrites, 3 ft.
(2) CONGLOMERATE; visible, 1 ft. 3 in.
(1) *Debris*.

The three feet of coal (3), in the conglomerate, thins out to nothing in three to four feet to the south, and in six to eight feet to north is squeezed out to the fraction of an inch. For several feet up in this Lower Conglomerate, from its base, there run streaks of hard cubical coal, filling up cracks in the conglomerate. These thin coal seams are usually in waves with the rocks and are commonly parallel to the stratification of the rocks, but sometimes they run at angles to this stratification and sometimes even perpendicular to it. The thicker of these coal seams in the hard conglomerate sometimes divide up into many coal streaks and sometimes many coal streaks unite and make a thin seam. Strange to say, the thickest portions of these thin coal seams are usually over the crests of waves where they sometimes are from four to six inches thick. In another place under "Durham Bluff," farther to the south, there shows the following outcropping:

DURHAM BLUFF SECTION, NO. 2.

(6) CONGLOMERATE (*Cliff Rock*), 60 ft.
(5) COAL; irregular, waving, 2 in. to 1 ft.
(4) *Sandstone*, *Shale*, COAL, the sandstone carries the coal in thin sheets, 6 in.
(3) *Shale*, COAL; the coal in thin sheets in the shale, the shale also has in it much limonite and pyrites, 4 ft.
(2) *Shale;* with much *black band* and some limonite seams and nodules of clay iron-stone and pyrites, almost a solid seam of iron ore, 4 ft.
(1) *Debris*.

On the brow of the mountain, over the *Upper Conglomerate*, there are scattered over the surface, in N. W. ¼ of S. 15, T. 5, R. 6 E., boulders of spongy sandy limonite. In this same quarter section, the *Cliff Seam* shows as a thin seam of coal mixed with slate, and in the S. E. ¼ of S. 16, T. 5, R. 6 E., there occurs the following section:

SECTION IN S. E. ¼ of S. 16, T. 5, R. 6 E.

(5) CONGLOMERATE (*Cliff Rock, Millstone Grit*); roof to rock-houses, with some limonite in spots and seams near the bottom, 50 ft.
(4) *Flagstones;* in regular layers, in back parts of rock-houses, carrying much pyrites which give rise to several fine chalybeate springs, 10 ft.
(3) *Shale*, COAL; the shale is sandy with the *coal* in thin streaks through it; this shale has also on the out-crop much limonite and copperas, 1 ft.
(2) *Shale;* with concretionary balls of concentric rings of limonite, visible, 4 ft.
(1) *Debris.*

The conglomerates of this last section have frequently been cut out into millstones, for which purpose they are said to be well suited.

At the old drift known as the "*Chatton's Mine*," on the side of the road down the mountain in the N. W. ¼ of S. 21, T. 5, R. 6 E., there is the following section:

CHATTON SECTION.

(6) *Debris*; loose conglomerate, etc., to level of plateau, 30 ft.
(5) CONGLOMERATE (*Upper*); 25 ft.
(4) *Sandstone;* slabby, 10 ft.
(3) COAL (*Sewanee Seam*), 1 ft. to 1 ft. 6 in.
(2) *Shale*, COAL; the coal in thin streaks in shale, 4 ft.
(1) CONGLOMERATE (*Cliff Rock*).

In the "Caldwell Gap" in S. W. ¼ of S 29, T. 5, R. 6 E., there is the following section:

CALDWELL GAP SECTION.

(7) CONGLOMERATE (*Upper*) 30 to 35 ft.
(6) *Flagstones*, 20 ft.
(5) *Sandstones;* with much limonite and copperas on surface, 6 to 8 in.
(4) COAL (*Sewanee Seam*); with much pyrites, 1 ft. 6 in.
(3) *Clay;* visible, 2 ft.
(2) *Debris*, 3 ft. 6 in.
(1) CONGLOMERATE (*Cliff Rock*).

The flagstones (6) are from six to eight inches in thickness and can be split with wedges like wood. On the mountain, in a branch in the S. W. ¼ of S. 19, T. 5, R. 6 E., near Mr. E. M. C. Harris, there is an out-cropping of coal which is reported to be eight inches thick. It was covered with water at the time visited and there showed no bedded rocks near it. It is however believed to be 20 to 25 feet under the *Upper Conglomerate* or to be of the same seam as the *coal* (4) of the above section.

On the high spur, in the south-east corner of the county between Subbett's Cove on the north and "*Buck's Pocket*" on the south, there is a very large sink. It is nearly a mile long from east to west, about one-fourth mile wide from north to south and some 125 feet deep, extending down through both the Upper and Lower Conglomerate of about fifty feet each in thickness. On the steep slopes of this spur, on both sides under the Lower Conglomerate, there is much loose limonite. This ore probably comes from the out-cropping of a seam just under the Lower Conglomerate. There is also on the brow of this spur, on both sides, blocks of loose conglomerate, 60 ft. x 60 ft. x 60 ft., that have split off from the cliff of the Upper Conglomerate. These blocks have split off by their weight, their support in the underlying softer rocks, having been weathered away. Some of these blocks have worked their way down the side of the spur to a greater or less distance while others are still in contact with the parent bluff at the bottom but separated from it at the top. On the Sublett's Cove side of this spur, in S. W. ¼ of S. 14, T. 6, R. 6 E., there is the following out-cropping:

SUBLETT'S COVE SECTION.

(7) *Debris;* to top of spur, 25 to 30 ft.
(6) CONGLOMERATE (*Upper*), 50 to 60 ft.
(5) COAL (*Sewanee Seam*), 1 to 1 ft. 6 in.
(4) *Slaty* COAL; visible, 8 in.
(3) *Debris*, 8 ft.
(2) CONGLOMERATE (*Cliff Rock*); pebbles mostly in patches, 50 to 60 ft.
(1) *Debris.*

This coal on the out crop appears to dip 15° to 20° to south-east.

On the opposite or "Buck's Pocket" side of the spur, near the school-house in N. E. ¼ of S. 22, T. 6, R. 6 E., there is the following section:

BUCK'S POCKET SECTION.

(5) CONGLOMERATE (*Upper*), 50 to 60 ft.
(4) COAL (*Sewanee Seam*); good, visible, 1 ft.
(3) *Debris*, 10 ft.
(2) CONGLOMERATE (*Cliff Rock*), 50 to 60 ft.
(1) *Debris*.

As will be seen from an inspection of the last four sections, the *Cliff Seam* does not show in either one of them. Some signs of it, doubtless could be found under the debris at the foot of the Lower Conglomerate.

3. COAL MEASURES OF MARSHALL COUNTY.

The Coal Measures of this county are divided into three parts by "Brown's Valley" and the Tennessee River. The portion on Raccoon Mountain, to the south-east of Brown's Valley, is estimated at about 250 square miles, and the portions to the north-west of this valley on Sand Mountain south of the Tennessee River and on Gunter's Mountain to the north of this river, at about 70 square miles each.

For a general description of these Coal Measures and of the plateaus formed by them see Introduction.

DETAILS.

A. COAL MEASURES OF RACCOON MOUNTAIN.—There are said to be numerous out-croppings of coal, from five to six inches thick, under the second bluff of the mountain between South Sauta and Town Creeks. This coal is probably of the *Sewanee Seam.*

At Jno. Crutcher's mine on Short Creek, about in S. 8, T. 7, R. 5 E., there is something like the following section:

CRUTCHER SECTION.

(8) CONGLOMERATE (*Cliff Rock*), 75 to 100 ft.
(7) COAL (*Cliff Seam*), 1 to 1 ft. 6 in.
(6) *Shale*, 1 ft. 6 in.
(5) *Sandstone*, 2 ft. 6 in.
(4) *Clay*, 2 to 3 ft.
(3) *Sandstone*, COAL; in thin seams in lower part of sandstone, 2 ft.
(2) *Shale*, 3 to 4 ft.
(1) *Debris;* conglomerate, sandstone, etc., to creek, one-third of mountain.

The following section on Short Creek, given by Prof. Tuomy, is most probably of the same seam as the *coal* (7) of the above section:

SHORT CREEK SECTION.

(4) *Sandstone;* forming good roof.
(3) COAL; of good qaulity, 1½ ft.
(2) *Underclay*, 2 ft.
(1) *Sandstone;* forming bed of creek.

Some three-fourths mile to the north-east of the *Crutcher Mine* on "*Mine Branch*," there is the following out-cropping:

MINE BRANCH SECTION.

(6) *Debris;* to level of plateau, 35 to 40 ft.
(5) CONGLOMERATE (*Upper*), 50 ft.
(4) *Shale*; with much iron, 10 to 12 ft.
(3) *Shale*, COAL; coal in thin streaks in shale, 6 in.
(2) COAL (*Sewanee Seam*), 10 to 12 ft.
(1) *Shale*, COAL; coal in thin streaks in shale visible, 10 to 12 in.

Where Scareham Creek runs into Short Creek about in S. 14, T. 8, R. 4 E., there shows the following section:

SCAREHAM SECTION.

(5) CONGLOMERATE (*Upper*), 75 to 80 ft.
(4) *Debris;* doubtless hides the coal of the last section, 50 ft.
(3) CONGLOMERATE (*Cliff Rock*), 80 to 90 ft.
(2) COAL (*Cliff Seam*), 1 to 1 ft. 6 in.
(1) *Debris*; loose conglomerates, etc., 100 ft.

On Cedar Branch, some three-fourths mile to the east of the locality of this last section, there shows the following out-cropping:

CEDAR BRANCH SECTION.

(5) CONGLOMERATE (*Upper*); visible, 25 ft.
(4) *Debris*, 10 to 15 ft.
(3) COAL (*Sewanee Seam*), 10 to 15 in.
(2) *Clay*, 3 to 4 in.
(1) COAL; under water, felt to a thickness of, 1 ft. 3 in.

Under the water-fall of Scareham and Whippoorwill creeks just as they come together and fall over the *Lower Conglomerate*, there is said to be an out-cropping of coal. It is of course of the *Cliff Seam.*

Short Creek as it runs over the Lower Conglomerate, in S. 22, T. 8, R. 4 E., forms a clear water-fall of about 30 feet. The upper strata of the cliff which forms this water-fall are very hard conglomerates and under them there are softer strata that have been denuded until there is beneath and behind the over-flow of water a comparatively dry *rock-house.* Just west of this water-fall, there is on the side of the road the following out-cropping:

SECTION IN S. 22, T. 7, R. 5 E.

(4) *Sandstone;* may be the *Upper Conglomerate*, 60 to 70 ft.
(3) *Sandstone*, COAL; coal in thin seams in sandstone, 4 ft.
(2) COAL; waving and irregular, out-crop, 4 to 6 in.
(1) *Shale, Sandstone*, 20 ft.

On the side of the Rome Ga., road as it ascends the mountain in "*Pole Cat Hollow*," about in S. 7, T. 8, R. 4 E., there shows the accompanying section:

POLE CAT HOLLOW SECTION.

(7) *Debris*; to top of mountain, 200 to 300 ft.
(6) CONGLOMERATE (*Lower*); visible, 7 ft.
(5) COAL, *Slate*, 3 in.
(4) *Fire Clay*, 6 in.
(3) *Slate*, COAL, 3 to 4 in.
(2) *Slate*, 2 in.
(1) COAL; visible to a thickness of 1 ft.

The strata of the above section are believed to be in a slide. The coal of this section is thought to be the same as that which is said to occur at the *Old Derrick Spring*, of which a reliable authority gives the following section:

DERRICK SPRING SECTION.

(5) *Sandstone*, 10 ft.
(4) *Clay Slate*, 5 ft.
(3) COAL and *Slate*; in thin laminal, 4 ft.
(2) COAL; hard and bright, 11 in.
(1) *Clay;* underbed.

This out-cropping of coal is said to be only ten feet higher than the Guntersville Court House, hence it must be in a slide.

In a cove, in S's 23 & 26, T. 8, R. 3 E., not very far from the foot of the mountain, there is considerable limonite. In places, it seems to be almost in ledges. It is mixed with debris of the Coal Measures and most probably comes from the seam that crops out near the base of the Coal Measures.

The crest of the mountain where it is ascended by the Gadsden or Turnpike road in S. 27, T. 8, R. 3 E., is about 350 feet above Big Spring Creek. The strata at this point are very perceptibly in waves from N. W. to S. E. In the wells near the county line in S. 11, T. 10, R. 4 E., there is said to be a seam of about three feet in thickness.

In a spring in the N. W. ¼ of S. 12, T. 10, R. 4 E., there is an out-cropping of coal that is reported to have been dug into to a depth of 18 inches without getting through it. This coal and that in the wells are most likely of a seam between the conglomerates, perhaps the Sewanee Seam.

Along the Gadsden road up the mountain in the N. W. ¼ of S. 25, T. 9, R. 2 E., near Big Spring P. O., there occurs the following out-crop:

SECTION IN N. W. ¼ OF S. 25, T. 9 R. 2 E.

(7) *Sandstones*, CONGLOMERATE (*Upper*), 60 ft.
(6) COAL, 10 to 12 in.
(5) *Clay*, 8 to 10 ft.
(4) *Limonite;* scaly and siliceous, stratified, 3 to 4 ft.
(3) *Debris*, 55 ft.
(2) CONGLOMERATE (*Lower*), *Sandstone*, *Debris*, 140 ft.
(1) *Limestone*, 40 ft.

B. COAL MEASURES OF SAND MOUNTAIN.—On the northwest side of Brown's Valley, only a few out-crops of coal are known of. On this side of the valley, however, there are numerous deposits of limonite near the foot of the mountain. Some of these deposits are of considerable size and contain very good ore. They all probably come from the out-cropping of the seam near the base of the Coal Measures. On top of the mountain, on the head-waters of Price's Creek, one of the head prongs of Mulberry Fork of

Black Warrior River, near the county line, there crops out a seam of coal about as follows:

PRICE'S CREEK SECTION.

(7) *Debris;* to level of plateau, 80 ft.
(6) *Sandstone;* massive and flaggy, 5 ft.
(5) *Shales, Sandstones,* 4 ft.
(4) COAL; variable, 5 to 6 in.
(3) *Shale,* 2 in.
(2) COAL 4 to 5 in.
(1) *Clay.*

This coal, it is believed belongs between the two conglomerates.

Mink Creek in its descent from the top of the mountain, as, it passes over the two conglomerates in S. 22, T. 8, R. 2 E. has two perpendicular falls of from 30 to 40 feet each within 50 to 75 yards of each other. In the bluff of one of these falls, there is said to be a seam of coal two inches thick.

There is a reported coal out-cropping in S. 11, T. 8, R. 2 E., on Beech Creek above *the falls.* It is probably between the two conglomerates.

In the vicinity of Arab P. O., in N. E. ¼ of N. E. ¼ of S. 26, T. 8, R. 1 E., there are out-croppings of a seam of red and mullatto plastic clay that is used for making jars, etc.

At Gilliam's Spring, in N. E. ¼ of N. E. ¼ of S. 23, T. 8, R. 1 E., near the county line, there is said to be a seam of coal in a soft blue slate.

On Shoal Creek, in S. 21, T. 7, R. 2 E., is a reported out-cropping of coal, from eight to twelve inches thick, under the *Lower Conglomerate* (*Cliff Seam*). This creek also makes two beautiful falls as it pours over the two conglomerates. There is also a reported out-cropping in the eastern part of S. 23, T. 7, R. 1 E., on the head-waters of Shoal Creek. It is probably of a seam above the two conglomerates.

It is stated on good authority, that at Mr. Hill's in T. 8, R. 2 E., there occurs the following section:

HILL'S SECTION.

(5) CONGLOMERATE (*Lower*), *and Sandstone* 90 ft.
(4) *Slate*, COAL; the slate is gritty and fossiliferous, it contains the coal in occasional thin streaks, 4 ft. 6 in.
(3) COAL, *Slate*; in layers, 6 in.
(2) COAL; soft and full of pyrites, 5 in.
(1) *Sandstone, Debris.*

Some 200 yards north of the above out-cropping and fifty feet higher than the *coal* (2), the same authority states that there is in the conglomerate a seam of very hard coal that varies in thickness from 0 to 5 inches and that alternates with a honey-comb mass of limonite.

There is a reported thin shaly seam of coal in the wells at Oleander, in S. 22, T. 7, R. 1 E.

In S. 11, T. 7. R. 1 E., there is said to be a coal out-cropping two feet thick that has been worked considerably by the neighborhood blacksmiths. It is most probably of the *Cliff Seam* under the Lower Conglomerate.

The Mountain Limestone is particularly well developed in Beard's Bluff where it is between 400 and 500 feet in thickness, over-laid with about 200 feet of Coal Measures. In the upper part of these limestones, there are seams about 18 inches thick, of almost pure flint, as seen in ledges in front of Judge O. T. Street's residence. There also crops out in the upper part of this limestone on the side of the road leading down to Fort Deposit Ferry a seam of very black bituminous shale about ten inches thick. Scattered over the plateau over the Lower Conglomerate here at Beard's Bluff there is considerable limonite of very good quality. Farther to the west, this limonite seems to get much more siliceous and to occur as ferruginous gravels of a clay iron-stone appearance, scattered over the surface.

C. COAL MEASURES OF THE CUMBERLAND MOUNTAIN SPURS. The Coal Measures north of the Tennessee River or those on Gunter's Mountain, in this county, are badly cut up by deep coves. They are variable in thickness. They sometimes reach a thickness of 250 feet and carry one are more

seams of coal. One of these coal seams is said to be in places between Guntersville and *Paint Rock Bluff* about three feet thick. The LaGrange sandstone that crops out on the sides of the mountains is comparatively thin. The following is a section of a spur of this mountain as it juts up against the Tennessee River, just above the mouth of Paint Rock River, in what is known as "*Paint Rock Bluff*."

SECTION OF PAINT ROCK BLUFF.

(3) COAL MEASURES; standing upward from the top of the bluff; they likely carry the *Cliff Seam* of coal, from 12 to 14 inches thick, 125 to 150 ft.

(2) *Mountain Limestone*; a dark blue limestone and a bluish gray argillaceous limestone, granular and shaly in places, capped with a hard flinty bluish gray limestone, a perpendicular bluff about 200 ft.

(1) *Debris*; to edge of water, about, 300 ft.

The bluff (2) is streaked or stained in its upper part from the depositions of chalybeate waters and hence the name, "Paint Rock Bluff." In the face of this bluff, near its bottom, are two caverns, whose gaping mouths are from 12 to 15 feet wide, and from 6 to 7 ft. high. They extend back into the bluff some 60 to 70 feet. A fine view is had of the Tennessee River from the top of this bluff, and of this bluff from boats on the river. The LaGrange sandstone is doubtless hid under the debris (1).

On the side of the mountain, just under the Lower Conglomerate or Millstone Grit bluff, in the N. W. corner of S. 8, T. 7, R. 4 E., there is much loose limonite. Just to the north-east of this locality, there was taking place at the time visited, June 16, 1887, a great slide in the softer rocks just under the above conglomerate bluff.

The Mountain Limestone in S. 19, T. 6, R. 4 E., is exposed to a thickness of from 350 to 400 feet. The upper part of it, throughout this section of country, is very cherty or siliceous. Over it, just under the Lower Conglomerate bluff, there is much loose limonite. There issues from this limestone a *big spring*, whose water runs a mill about 1¼ miles farther up in the cove, then sinks, and after running under

the mountain for about one mile, makes its appearance to run another mill almost as soon as it comes to light. There are many of these *big springs* in this limestone along the foot of the mountains, and it is no unusual thing for them to sink and to come to light again after running greater or less distances under the mountains.

The following two out-croppings are given upon reliable authority as occurring in S. 27, T. 5, R. 4 E.

SECTION I.

(4) *Sandstone;* porous and fossiliferous, 5 ft.
(3) *Slate;* gray and sandy, 5 ft.
(2) COAL, 9 in.
(1) *Clay;* underbed.

SECTION II.

(3) *Slate;* blue and sandy, 35 ft.
(2) COAL; hard and bright, 1 ft. 10 in.
(1) *Slate;* hard, underbed.

The coal of this *second out-cropping*, in a well, nine feet below the surface, in the S. E. $\frac{1}{2}$ of S. W. $\frac{1}{4}$ of S. 27, T. 5, R. 4 E., is reported to be 31 inches thick. It is believed to be of a seam some fifty below the coal of the *first out-cropping.*

4. COAL MEASURES OF MORGAN COUNTY.

The Coal Measures of this county are all connected, though badly cut up by coves. They occupy the northern edge of the elevated plateau of Sand Mountain south of the Tennessee River. This plateau is from 1100 to 1500 feet above tide water level and from 500 to 900 feet above the Tennessee River. The most northern edge is the highest portion of it; the plateau sloping towards the south or south-west with the dip of the strata. The portion within this county, or the Coal Measures of this county, are estimated at about 275 square miles. These measures have a maximum thickness of about 500 feet and as many as two seams of coal. For a general description of these measures or of the plateau region of Morgan county, see *Introduction.*

DETAILS.

Along the Turnpike road or Huntsville and Warrenton road, as it ascends the mountain south of Whitesburg, in S. 12, T. 6, R. 1 W, there occurs the following section:

SECTION IN S. 12, T. 6, R. 1 W.

(8) SANDSTONES, *Shales;* the sandstones cap the mountain and likely correspond to the Upper Conglomerate, 60 ft.
(7) COAL (*Sewanee Seam*), 6 in.
(6) CONGLOMERATES, *Sandstones, Shales;* these conglomerates are of the *Lower Conglomerate or Cliff Rock*, 60 ft.
(5) COAL; (*Cliff Seam*); only a few inches.
(4) *Sandstones, Shales*, 60 ft.
(3) *Mountain Limestone;* about, 330 ft.
(2) *LaGrange Sandstone;* bench, 50 ft.
(1) *Mountain Limestone;* to second bottom, 60 ft.

In the limestone (1) of the above section there are numerous large sinks, caves, and springs. The best known of

the caves is perhaps the "*Ittachoomah Cave*" in the S. E. ¼ of S. 35, T. 5, R. 2 E. This cave extends clear through a spur of the mountain and can be traversed from east to west about one fourth mile. It contains deposits of nitre-earth that were worked during the war. It is also a home for bats and contains considerable deposits of bat-guano. The best known of the springs are perhaps the Cave and Valermoso Springs. The Cave Spring runs from out of a large rock-house in S. E. ¼ of S. 4, T. 6, R. 3 W. It is dammed up into a subterranean mill-pond and runs a mill within sixty feet of its mouth. The Valermoso Springs, in S. 19, T. 6, R. 1 W., are widely known for their medicinal virtues. They consist of a "White Sulphur" or "Iodine Spring," a "Black Sulphur Spring" and a "Chalybeate Spring," all within a circle of ten feet diameter. Their waters are of moderate strength and are quite palatable. The "White Sulphur" or "Iodine Spring" is the most noted of these springs, and its water is said to be an unfailing remedy for rheumatism, consumption, and diseases of the kidneys, stomach, skin and liver. They rise in the limestone just under a bluff, 45 to 50 feet high, of the LaGrange Sandstone upon which the Hotel and cottages are built. Of the sinks, the "Newsome Sinks," in S's 2, 3, 11 and 12, T. 1, R. 1 W., are the most remarkable. These sinks consist of many small sinks within a big one. The big sink is some two miles long from north-west to south-east and about one-fourth mile broad. It extends down through the capping Coal Measures into the Mountain Limestone. It is surrounded by bluffs, especially of the Lower Conglomerate, and under these bluffs there are numerous *rock-houses* and caves, which formerly sheltered and hid the *moonshiners* in their illicit work. From under these bluffs, there issue numerous fine springs, whose waters, together with the rain water caught in the big sink, disappear in the little sinks to appear as *big springs* around the foot of the mountain, usually near the heads of the coves. Coal out-croppings are also said to occur under these bluffs; they are doubtless of the two seams of the last section. The *coal* (7) of that section crops out

in the N. E. ¼ of S. 14, T. 6, R. 1 W.; it is between sandstones and is of very irregular thickness. Its maximum thickness is about 11 inches. As the mountain is descended into a cove of Cataco Creek, about one mile south of the south east end of "Newsome Sinks," the Coal Measures appear to have a thickness of about 400 feet, with about 300 feet of limestone under it to the level of the cove. Near the head of this cove and at the foot of the mountain, in S. 24, T. 7, R. 1 W., there runs from a cave a *big spring*, which is doubtless the outlet for the waters of "Newsome Sinks." A little farther up in the cove, to the east, is a cave that has been traversed for about one-half mile. It also contains heaps of nitre-earth that were worked during the war. There is also in this cove, along the foot of the mountain, some dry sinks which during freshets, it is said, spout out large volumes of water.

On the head waters of the North Prong of Cataco Creek there occurs on the side of the mountain in S. 11, T. 8, R. 1 W., the following out-cropping:

OUT-CROPPING IN S. 11, T. 8, R. 1 W.

(13) *Debris*; gradual slant to top of plateau, 40 to 50 ft.
(12) *Bluff;* probably Upper Conglomerate, 15 to 20 ft.
(11) *Sandstones, Shales, Debris;* 110 ft.
(10) CONGLOMERATE (*Cliff Rock*); massive bluff around cove, 25 ft.
(9) *Sandstones*; flaggy and wavy, probably a conglomerate in places, 15 ft.
(8) COAL, (*Cliff Seam*); very irregular in thickness, though hard and good, 6 to 8 in.
(7) *Sandstone*, COAL; the sandstone carries the coal in thin sheets, ½ in.
(6) COAL; slaty, 1½ in.
(5) *Shale;* black and fossiliferous, 3 ft.
(4) COAL; slaty, 10 in.
(3) *Sandstone, Shale*, 8 to 10 ft.
(2) *Debris*, 20 ft.
(1) *Limestone;* to level of cove, about, 200 ft.

On the mountain not far from the above out-crop, there is a large sink. The *Sewanee Seam* is doubtless covered by the debris of (11) of the above out-cropping, as it crops out some

four to five feet above the Lower Conglomerate on a branch in S's 13 & 24, T. 8, R. 1 W.

The *Cliff Seam* of coal is said to show in out-crops under bluffs in S. 36, T. 7, R. 2 W.

Mineral tar or *liquid bitumen* oozes up from debris, overlying Mountain Limestone, in a ditch near the foot of the mountain in S. 15, T. 8, R. 3 W. This mineral tar or liquid bitumen, after exposure, looks like the pitch from an old wagon hub. From this, so called, *Tar Spring*, there were dug out some calcite crystals, stuck together by tne waxy matter.

On Flint Creek, in the S. W. ¼ of S. W. ¼ of S. 33, T. 8, R. 3 W., there is the following out-crop.

FLINT CREEK OUT-CROP.

(12) *Soil, Sandstone*, 20 ft.
(11) *Debris*, COAL; the coal reported to be near the top and to be six inches thick, 40 ft.
(10) CONGLOMERATE, *Sandstone;* this is the *Upper Conglomerate*. 50 ft.
(9) COAL, CONGLOMERATE; the coal is in ten or more seams, each from 0 to 2 inches thick, through the conglomerate, 10 ft.
(8) *Debris*, 40 ft.
(7) CONGLOMERATE, SANDSTONE; this is the *Lower Conglomerate*, 50 to 60 ft.
(6) *Clay*, 2 to 3 in.
(5) *Shale*, COAL; the shale is of a dull black color like *mother of coal*, and carries the coal in thin irregular seams, 5 ft.
(4) *Debris*, 10 ft.
(3) COAL; reported.
(2) *Debris*, 12 to 15 ft.
(1) *Mountain Limestone.*

The thin seams of coal of (9) were seen in one place to have collected together into a seam varying from six to fourteen inches in thickness, and which is said to be in another place 2 feet 6 inches thick.

South of Wilhite station, on the side of the L. & N. R. R., in the S. E. ¼ of S. 31, T. 8, R. 3 W., the *coal* (5) of the above section has been driven into for a few feet. It is only two to three inches thick and is covered by from four to six feet

of black shale which carries thin streaks of coal. Some sixty feet above this out-crop, another thin coal seam was dug into. It is probably of (9) of the above section.

There is no coal known in this county west of the L. & N. R. R., though the Coal Measures are in places as much as 250 feet in thickness. Just to the west of the above railroad, they are about 200 feet thick, and in Day's Gap, in S. 25, T. 8, R. 5 W., and Basham's Gap, in S. 32, T. 8, R. 5 W., they are from 220 to 225 feet thick.

5. COAL MEASURES OF LAWRENCE COUNTY.

The Coal Measures of Lawrence county occupy the summit of the plateau, which along the southern edge of the county rises some 350 feet above the Moulton Valley. They extend clear across the county from east to west and from three to eight miles up in the county from the south. They are most elevated along the northern edge or crest of the mountain and slope towards the S. S. W. from this edge, which forms the divide between the waters that flow south into the Warrior River and those that flow north into the Tennessee River. They cover about 160 square miles and are from 100 to 300 feet in thickness. They carry no known commercially workable seams of coal, though on many of the branches or creeks, there are coal out-crops from one sixteenth of an inch to ten inches in thickness, and, in a few places, to nearly 2 feet in thickness.

DETAILS.

The Coal Measures show on the side of the mountain, in the S. W. ¼ of S. 7, T. 8, R. 6 E., a thickness of about 250 feet, and in S. 19, T. 8, R. 6 W., and S's 4 & 30. T. 8, R. 7 W., coal out-croppings, and, near the top of the mountain in S. W. ¼ of S. 30, T. 7, R. 7 W., a coal out-cropping that is said to be from 8 to 10 inches thick.

At Cave Spring, in the N. E., corner of S. 26, T. 8, R. 6 W., the head of the Capses or Tar Spring Creek, the Lower Conglomerate forms the cover to a rock-house. It here has a dip to the N E., from a wave in the strata, though just to the west of the spring the dip is about 20° to the S S W. A short distance below the cave spring, the branch has cut through the Coal Measures down into the underlying crenordal limestones. These limestones or sub-carboniferous

strata, down near the Tar Spring, in the N. W. ¼ of S. W. ¼ of S. 26, T. 8, R. 6 W., show to a thickness of 40 to 50 feet above the bed of the creek, and are said to show on down the creek for a distance of some two miles before becoming covered up by Coal Measures. On this creek in the N. E. ¼ of S. 33, T. 8, R. 6 W., there is said to be under a bluff and between hard rocks, a seam of coal about 9 inches in thickness. It is probably just under the Lower Conglomerate.

Signal Mountain, in the N. W. ¼ of S. W. ¼ of S. 1, T. 8, R. 6 W., is a high projecting point out to the north from Sand Mountain, that was used as a signal station by U. S. topographical enginers. It is capped with Coal Measures, that have been separated by denudation from those of the divide or of Sand Mountain on the south. There is said to be a thin seam of coal under the bluff of the Lower Conglomerate that caps this high point.

Just to the east of where the Penitentiary Mountain, a spur of Sand Mountain, leaves the Sand Mountain, i. e., in the S. W. ¼ of N. W. ¼ of S. 13, T. 17, R. 8 W., there is an out crop of coal near 2 feet in thickness. This coal shows for some distance under a bluff and has been considerably dug by the neighborhood blacksmiths. To the west of this out-cropping about one-fourth mile, in S. E. ¼ of N. E. ¼ of S. 14, T. 7, R. 8 E., there is the following out-crop of the same seam of coal.

OUT-CROP IN THE S. E. ¼ OF N. E. ¼ OF S. 14, T. 7, R. 8 E.

(7) *Capping Bluff;* Lower Conglomerate, 15 ft.
(6) *Debris*, 10 ft.
(5) *Sandstone, Shale;* the shales in thin partings, 4 ft.
(4) COAL; seemingly good, about, 1 ft. 10 in.
(3) *Shale;*, blue, just visible.
(2) *Debris;* about, 40 ft.
(1) *Mountain Limestone.*

The dip is a few degrees to the S S W. The coal in the bed appears quite pure, though it is said to give on analysis a large amount of Sulphur. It is said to crop out also in a ravine to the south of the divide.

On the head waters of Brushy Creek, in the N. W. ¼ of S. 25, T. 8, R. 8 W., there is the following out-crop:

BRUSHY CREEK OUT-CROP.

(5) *Debris*; to level of plateau, 60 to 70 ft.
(4) CONGLOMERATE (*Lower*); very massive, 40 ft.
(3) COAL (*Cliff Seam*), ½ in.
(2) *Debris;* with iron concretions, 50 ft.
(1) *Sandstones;* slabby and fine grit, along bed of branch with chalybeate and limestone springs.

The *coal* (3) of the above section is said to appear in out-crops on Ivey Branch, in the S. E. corner of S. 34, T. 8, R. 8, W. from six to eighteen inches thick. It also shows in the N. E. ¼ and N. W. ¼ of S. 35, and in S. W. ¼ of S. 22, all of T. 8, R. 8 W.

The Coal Measures have been cut through and the Mountain Limestone exposed to a thickness of some 40 feet in the deep ravines along the principal branches of Sipsey River in T. 8, R's 8 & 9 W. These exposed limestones extend south ward to within about one mile of the county line when they finally become covered by the Coal Measures.

At Hall's Mill, in the S. E. ¼ of S. 32, T. 8, R. 9 W., there is the following out-crop:

HALL'S MILL OUT-CROP.

(3) CONGLOMERATE (*Upper*); over the plateau, soft and friable on weathering, whitish and pinkish, 20 ft.
(2) *Sandstone, Shale, Debris*, 160 to 170 ft.
(1) CONGLOMERATE (*Lower*); very massive with divisions of shales and sandstones in upper part, 50 to 60 ft.

The Lower Conglomerate of this section forms a bluff about 50 feet high and over it, just above the mill, there is a clear water-fall of about 30 feet. A dam of a few feet in height, of loose rocks, is thrown across the creek just above the water-fall. This mill is within one-half mile of the head of the creek, which is fed by large springs that always furnish plenty of water.

In "*Elbow Hollow*," so named from a crook in a chestnut tree, there is in the N. E. ¼ of S. 8, T. 8. R. 9 W., the following out-crop:

ELBOW HOLLOW OUT-CROP.

(4) *Debris;* to level of plateau, some, 200 ft.
(3) *Sandstone*, 8 ft.
(2) COAL; good and hard with much mineral charcoal, 6 in.
(1) *Shale*; bluish.

The Lower Conglomerate is covered by the *Debris* (4) of the above section and the *Coal* (2) must be 30 to 40 feet under this conglomerate, and is probably the *Dade Seam.*

On Tedford Creek, in the N. E. ¼ of S. 15, T. 8, R. 9 W., there is the following out-crop:

TEDFORD CREEK SECTION.

(4) *Debris*; covering *Lower Conglomerate*, some 250 ft.
(3) *Sandstone;* bluff with small *rock-houses*, 10 ft.
(2) *Debris;* covering coal of last section, 5 ft.
(1) *Mountain Limestone*; light gray with black specks, fossiliferous, to bed of creek, 35 ft.

From under the *limestone* (1) there issues a *big spring* of cool water which within 200 to 300 yards, falls into sinks.

On Panther Branch, in the S. W. ¼ of S. 2, T. 8, R. 9 W., there is the following out-crop:

PANTHER BRANCH OUT-CROP.

(5) *Debris*; covering *Lower Conglomerate*, some 200 ft.
(4) *Sandstone*; bluff with small rock-houses, 10 ft.
(3) COAL; covered up when visited, but has been dug considerably by neighborhood blacksmiths, said to be 8 in.
(2) *Debris*, *Sandstone*, 20 ft.
(1) *Mountain Limestone*; to bed of branch 20 ft.

The *sandstone* (4) of the last two sections and (3) of the *Elbow Hollow Section*, can be seen as a bluff with small rock-houses under it in all of the deep hollows hereabouts, and the *Lower Conglomerate*, in loose boulders, shows high

up on the sides of the hills. The coal of the above sections is said to show also in the S. W. ¼ of S. 11, T. 8, R. 9 W., and the S. E. ¼ of S. 36, T. 7, R. 9 W. There is a reported *salt-peter cave* in a large *rock house* in the S. E. ¼ of S. 3, T. 8, R. 9 W. From the description given of it, the back of this *rock-house* must be of the same horizon as the above coal. Salt-peter is said to have been made from the earth of this rock-house during the war.

Along the road down the mountain in the *Steenson Gap*, in S. 28, T. 7, R. 9, 7 W., there is the following out-crop.

STEENSON GAP SECTION.

(10) *Debris*; partly *Drift*, to level of plateau, about 50 ft.
(9) SANDSTONES, *Debris*; the sandstones are massive, pinkish and friable, and probably corresponds to the *Upper Conglomerate*, 15 ft,
Debris, *Sandstone*, 45 ft.
(8) LOWER CONGLOMERATE, *Debris*; 20 ft.
(7) *Sandstones*, *Shales*, 60 ft.
(6) *Debris*, 10 ft.
(5) LIMONITE; concretionary, honey-combed, 3 ft.
(4) *Shales*, *Sandstones*, *Debris*; with a bench, 85.
(3) *Mountain Limestone*; visible 30 ft.
(2) *Debris*, (*LaGrange Sandstone*); a bench covered with small loose sandstones, 45 ft.
(1) *Mountain Limestone;* fossiliferous, dipping to south-west, to foot of mountain, 60 ft.

6. COAL MEASURES OF FRANKLIN COUNTY.

The Coal Measures of Franklin County cover all of the territory to the south of the bluffy escarpment or mountain in the southern part of the county, though they show as surface rocks only along these escarpments and the creeks to the south of them, being elsewhere hidden by the overlying Drift and Cretaceous strata. Their northern limits, or the mountain, near the eastern edge of the county, is some eleven miles north of the southern boundary of the county, but these limits or this mountain gradually recede towards the south as you go westward until they pass out of the county, on the waters of Bull Mountain Creek, some eight to ten miles east of the western boundary of the county. The escarpment or the mountain also loses its importance towards the west, disappearing or becoming covered up by the Drift and Cretaceous formations except along the water courses, before they get half across the county, though they are some 300 feet high, above the valley to the north of them, in the eastern part of the county. The Coal Measures of this county show to a thickness of about 250 feet and cover about 150 square miles.

DETAILS.

Thin out-crops of coal show in S. 8, T. 7, R. 10 W.; in S.'s 23 and 29, T. 7, R. 11 W., and in S's 7 and 32, T. 8, R. 11 W. The last mentioned of these coal out-crops is in a well and is said to be 18 inches thick.

Coals doubtless crop out in this county on the waters of Big Bear Creek, as they do in Marion County near the county line, as in the following section :

BIG BEAR CREEK SECTION

(7) *Debris*, DRIFT, 60 ft.
(6) SANDSTONE; believed to correspond to the *Upper Conglomerate*, 40 ft.
(5) COAL; thin.
(4) *Shales*, 10 to 15 ft.
(3) COAL, 8 to 20 in.
(2) *Sandstones*, *Shales*, 15 to 20 ft.
(1) CONGLOMERATE; believed to be the *Millstone Grit*, 60 ft.

On Bull Mountain Creek, there are numerous out-crops of two seams of coal from six to nine inches each in thickness, in S's 35 and 36, T. 8, R. 14 W., as in the following section:

BLUE MOUNTAIN CREEK SECTION.

(6) *Debris*, DRIFT, 15 ft.
(5) CONGLOMERATE; believed to be the *Lower Conglomerate*, 40 ft.
(4) COAL, 9 in.
(3) *Clay;* very plastic, visible, 1 ft.
(2) *Debris*, 75 ft.
(1) *Shale*, COAL; the coal is thin streaks in the shale near the bottom, visible, 10 to 15 ft.

In the S. E. ¼ of N. E. ¼ of S. 35, T. 8, R. 14 W., the thin coal streaks of (1) of above section collect together into a seam about six inches thick. The Conglomerate (5) forms a high bluff, that in many places near its base, is covered with a thin skim of limonite, and carries a good deal of limonite in honey-comb masses and in balls. It has also in places large rock-houses with a luxuriant growth of beautiful and rare ferns. The coals of this county are commonly pyritous, and the flagstones often have a good grit for grindstones. The growth over the plateaus consist of chestnuts, chestnut-oaks; white, black, Spanish and post oaks; black-jacks, hickories, black-gums, sweet-gums, persimmons, pines, etc., and, in the bottoms, poplar, linn, black and white walnuts, sour tree, wild cherry, etc.

7. COAL MEASURES OF DeKALB COUNTY.

The Coal Measures of DeKalb County are divided into two parts by Wills Valley, a denuded anticlinal valley. They comprise about 390 square miles to the north-west of that valley, on Raccoon Mountain, and about 100 square miles to the south-east of it on Lookout Mountain. Like the Coal Measures of Madison, Jackson, etc., counties, they are confined to elevated plateaus, on the tops of mountains, bounded by steep mountain sides that are capped with perpendicular bluffs. For a general description of the plateaus and Coal Measures of this county, see *Introduction*. Many of the out-crops of the *Cliff Seam*, and perhaps of the other sub-conglomerate seams, in this county rapidly thicken as drifted into. This is doubtless due to their having been more or less squeezed out or crushed out on the out crops by the ponderous conglomerate bluffs just over them. This thickening would doubtless cease in a short distance from the out-crops or as soon as the crushing or sinking effects of the conglomerate bluffs on the out-crops gave out.

DETAILS.

A. COAL MEASURES OF RACCOON MOUNTAIN.—Near the county line in S. 8, T. 10, R. 6 E., there is the following out-crop:

SECTION IN S. 8, T. 10, R. 6 E.

(7) CONGLOMERATE (*Upper*); massive,
(6) COAL, 6 to 8 in.
(5) *Debris*, 25 ft.
(4) *Sandstone*; hard and massive, 15 ft,
(3) *Debris*, 50 ft.
(2) CONGLOMERATE (*Millstone Grit*), 30 ft.
(1) *Debris*.

The strata of the above section are bent over until they dip 75° to 80° to S. E.

On the side of the road as it leads up the mountain in N. W. ¼ of S. 33, T. 9, R. 6 E., there is a showing of coal smut from six to eight inches thick. It is over the Lower Conglomerate and is most probably of the same seam as (6) of the last section. Along with this coal smut, there is an out-crop of plastic clay, of a light ash color, about ten feet thick. Thirty to forty feet higher is another out-crop of a similar clay. These clays are now being made into jugs on the mountain and answer very well for this purpose.

The Millstone Grit or Cliff Rock on the side of the mountain in the N. W. ¼ of N. W. ¼ of S. 24, T. 9, R. 6 E., has a dip of about 75° to N. W. and in the S. E. corner of S. 6, T. 9, R. 7 E., and the N. E. ¼ of S. 32, T. 8, R. 7 E., there are large detached boulders of it, house-size in dimensions, on the side of the mountain and in the narrow *Sand Valley* at its foot. The Millstone Grit is here some 75 feet thick and dips about 30° to N. W. The *Cliff Seam* of coal shows under it, in some places a few inches thick.

The most south-western Mountain Limestone seen in DeKalb county on this, the N. W. side of Wills' Valley, is along the foot of the mountain in the S. E. ¼ of S. 29, T. 8, R. 7 E. It extends about one-fourth the way up the mountain, and shows to the north-east for about one-fourth mile before giving out to set in again. In the road up the mountain at Winston Gap, in the N. E. ¼ of S. 36, T. 7, R. 7 E., about 50 feet from the top of the mountain, there is an out-crop of coal with fire clay. Below this coal out-crop, there is considerable limonite on the side of the mountain. The Coal Measures along the above road are believed to be partly in a slide. In another gap about, one mile farther to the north-east, the strata have a dip of about 25° to N. W. The Mountain Limestone shows in between these gaps. The *Cliff Seam* of coal is said to crop out in the N. E. ¼ of S. 19, T. 7, R. 8 E., and to be sixteen inches thick. On the side of the mountain under it, there is considerable limonite.

On top of the mountain at Mr. John W. Neal's, in the S. ½ of N. E. ¼ of S. 8, T. 7, R. 8 E., there occurs the following section:

THE NEAL SECTION,
IN S. ½ OF N. E. ¼ OF S. 8, T. 7, R. 8 E.

(4) *Shale;* hard, visible about 6 ft.
(3) COAL; about 10 in.
(2) *Clay;* parting 4 to 6 in.
(1) COAL 8 to 10 in.

This coal is most probably of the *Sewance Seam* or (6) of the *Etna Section.*

On the side of the mountain opposite, or to the south-east of Mr John W. Neal's and for several miles to the north-east are reported out-croppings of the *Cliff Seam,* (5) *of the Etna Section,* from 8 to 15 inches in thickness.

In the road up the mountain at the Gibson Gap, in the N. W. ¼ of S. 25, T. 6, R., 8 E., are the out-croppings of two sets of conglomerates that are separated by from 25 to 30 feet of flagstones. In these flagstones, there are several chalybeate springs which probably have their origin in thin seams of coal. In the bluffs of the lower of these conglomerates, there are some strongly warped or bent flagstones.

Still farther to the north-east in the N. W. ¼ of S. 19, and S. E. ¼ of S. 18, T. 6, R. 9 E., the *Cliff Seam* is only about six inches thick on the out-crop. The strata of the conglomerate bluff (*Cliff Rock*) show here plainly that they are in long flat waves from north-east to south-west.

On top of the mountain in S's 15, 27 & 28, T. 6, R. 8, E., there are out-crops of coal from 4 to 14 inches in thickness. These out-crops are of what is called the surface seam, which is most probably the same as the *Sewanee Seam,* (6) of the Etna Section.

On a branch in S. 23, T. 6, R. 8 E., there is the following section:

SECTION IN S. 23, T. 6, R. 8 E.

(4) *Conglomerate* (Upper)
(3) *Debris;* about 15 ft.
(2) *Shale*; visible 5 ft.
(1) COAL, 1 ft. 2 in.

The dip is here about 10° to N. W. though the strata are in waves from N. W. to S. E.

About one-fourth mile to the south-west is another test pit in which the coal is reported to be about 12 inches thick and to overlie about 4 inches in thickness of *mother of coal.* The coals of these two pits are also most probably of the *Sewanee Seam*, (6) of the Etna Section.

Under the *Lower Conglomerate* or *Cliff Rock* bluff in the S. E. ¼ of S. 24, T. 6, R. 8 E., is a *rock-house* that has been converted into a milk-house by the building of a wall across its mouth. A short distance to the north-east, this bluff is some 80 feet high and the *Cliff Seam* of coal under it is on the out crop from 4 to 12 inches in thickness.

Some half-mile still farther to the north east in the N. W. ¼ of S. 19, T. 6, R. 9 E, the *Cliff Seam* has been drifted into for about 15 feet. At the head of this drift there is the following section:

SECTION IN N. W. ¼ OF S. 19, T. 6, R. 9 E.

(6) *Conglomerate* (*Lower*); bluff, 50 ft.
(5) COAL, 1 ft.
(4) *Fire Clay* 4 ft.
(3) *Shale*, 3 ft.
(2) COAL; reported, 1 ft. 8 in.
(1) *Fire Clay.*

On the out-crop, the coals (2) and (5) of this section are from 12 to 14 feet apart. They were therefore rapidly approaching each other as drifted into. The coming together of these two coals is in the thinning out of the shale (3) and the rising correspondingly of the under coal (2). The conglomerate bluff is here uniformly full of pebbles from the bottom to the top. The dip is about 20° to N. W. Some 150 yards to the north-east, the coal just under the conglomerate bluff, or (5) of the above section is from 8 to 12 inches thick, and has in it streaks of pyrites. Here the fire-clay underbed, (4) of the above section, is about 4 feet 6 inches thick. The coal (2) is not exposed and so I can't say anything as to its thickness or the thickness of the

shale (3). There are here no pebbles in the lower part of the conglomerate bluff and the dip is from 20° to 25° to N. W.

Farther to the north-east, in the southern part of S. 18, T. 6, R. 9 E. the *Cliff Seam* of coal on the out-crop is only about 12 inches thick, though about 4 feet under the bluff it is some 26 inches thick.

To the north-west of here from 3 to 3½ miles, to the north-west of Town Creek, there are reported to be several out-crops of coal from 8 to 18 inches in thickness. They are said to have a gray slate cover and a fire-clay underbed. They are most probably of the *Sewanee Seam*, (6) of the Etna Section, though they may be of the *Kelly Seam*, (8) of the Etna Section.

On the top of the mountain and seemingly just over the Lower Conglomerate, in a glady place in the S. E. corner of S. 7, T. 6, R. 9 E., is an out-cropping of a seam of sandy brown ore about 18 inches thick. It is full of little holes and has an argillaceous look.

In the S. W. ¼ of N. W. ¼ of S. 17, T. 6, R. 9 E., is a pinnacle or columnar rock of the height of the bluff of Lower Conglomerate from which it is separated at the base by only five to 6 feet and the top by about 15 feet. In diameter, its base is about 25 feet, its capping rock about 20 feet, and its neck, just under the capping rock, some 15 feet. Its height is about 60 feet and as it is but a part, detached by denudation, of the adjacent bluff, and is of course of the same material as this bluff or as the Lower Conglomerate or Millstone Grit.

Just to the north-east of the above *pinnacle rock* the *Cliff Seam* of coal has been drifted into for 15 to 20 feet. At the head of this drift, there is about the following section :

SECTION IN THE S. W. ¼ OF N. W. ¼ OF S 17, T. 6, R. 9 E.

(9) CONGLOMERATE (*Lower*); bluff, about 60 ft.
(8) COAL, 6 to 8 in.
(7) *Slate*; parting, 1½ in.
(6) COAL, 2 in.
(5) *Slate*, 1½ in.
(4) COAL, 2½ to 3 in.
(3) *Slate*, 1½ in.
(2) COAL, 1 in.
(1) *Fire Clay;* underbed.

In this drift the coal seam varies more or less in thickness from the coming in, in places, between it and the conglomerate of seams of shale. The strata are in long flat waves from N. E. to S. W., and the dip is from 30° to 35° to the N. W.

For some three-fourths of a mile to the north-east, the above seam of coal, the *Cliff Seam*, has been dug or drifted into in three places and in these drifts it is said to vary from 16 inches to 3 feet in thickness. Near the center of S. 8, T. 6, R. 9 E., it is about 14 inches thick on the out-crop, but about 10 feet under the conglomerate bluff it gets to be some 42 inches thick. Of this 42 inches, the lower 15 inches are divided up by irregular streaks of slate, the uppermost 6 to 8 inches are a cubical coal, and the remaining central portion is a very soft and a very rich or very bituminous, leaf-like coal. This leaf-like coal is of very fine quality and will doubtless make the best of coke. The underbed is a fire clay and the cover is the conglomerate bluff some 50 feet in height. This bluff is made up of two massive strata that are separated by only a few inches of shaly or flaggy material. The lower stratum is about 15 feet in thickness and in places is destitute of pebbles, and in places its lower 3 to 4 feet are more or less flaggy, and sometimes false-bedded. The strata are in waves from N. E. to S. W., and the dip is some 30° to 35° to the N. W.

In the above seam of coal, the *Cliff Seam*, there is in the north-east corner of S. 8, T. 6, R. 9 E., a drift some 8 feet

wide that extends under the conglomerate bluff about 12 feet. At the back or head of this drift in the north-east corner, there is something like the following section:

SECTION IN N. E. CORNER OF S. 8, T. 6, R. 9, E.

(11) CONGLOMERATE, (*Lower*); bluff, about 50 ft.
(10) COAL, 6 in.
(9) *Shale*, 1½ in.
(8) COAL, 8 in.
(7) *Shale*, 1 in.
(6) COAL, 4 in.
(5) *Shale*, 1 in.
(4) COAL, 8 in.
(3) *Shale;* clayey, 1 in.
(2) COAL, 6 in.
(1) *Fire Clay;* underbed, visible 3 ft. 0 in.

In the north-west corner of the back or head of this drift, the coal seam is said to be 43 inches thick. In this drift the coal is jam up against the massive conglomerate cover. This conglomerate at the bottom, however, has no pebbles in it, and in places passes into flags showing false-bedded. The strata are in waves from N. E. to S. W., and the dip is about 30° to the N. W.

In the road up the mountain at the Smith Gap, in the N. E. ¼ of S. E. ¼ of S. 5, T. 6, R. 9 E., there is the following out-crop.

OUT-CROP AT THE SMITH GAP IN THE N. E. ¼ OF S. E. ¼ OF S. 5, T. 6, R. 9 E.

(7) CONGLOMERATE (*Lower*); bluff.
(6) *Flagstones*, 4 to 5 ft.
(5) *Iron Ore*, 3 to 6 ft.
(4) *Flagstone;* 0 to 3 ft.
(3) COAL; good, 1 ft.
(2) COAL; slaty, 6 in.
(1) *Fire Clay.*

In the strata between the coal (3) and the conglomerate (7) there are some nodules of clay iron-stone and iron-stone pyrites. The upper part of the conglomerate along the crest of

the mountain has a dip of about 50° to the N. W., though, in going to the N. W., they soon flatten to a dip of not over 15° to N. W.

In an old road in the N. E. ¼ of S. 5, T. 6, R. 9 E., there is the following out-crop.

OUT-CROP IN N. E. ¼ OF S. 5, T. 6, R. 9 E.

(4) *Sandstones;* massive.
(3) *Debris;* about 15 ft.
(2) *Sandstones, Debris*; the sandstones are flaggy, 4 to 5 tt.
(1) COAL; smut, 4 to 6 in.

This coal smut is probably of (10) of the Etna Section.

Along Town Creek, in the N. E. ¼ of S. 5, T. 6, R. 9 E., the Upper Conglomerate, (7½) of the Etna Section, shows that it is in waves from N. W. to S. E.

In W. J. Hamman's field in the eastern part of the S. E. ¼ of S. 32, T. 5, R. 9 E., there is a reported out-cropping of coal about 20 inches thick. This out-cropping is probably of (9) of the Etna Section, as is most probably the coal smut, about 12 inches thick, that shows in a road in the S. W. ¼ of N. W. ¼ of S. 33, T. 5, R. 9 E. The Kelly Seam, (8) of the Etna Section, is here probably entirely wanting. The *Upper Conglomerate* here crops out along the west bank of Town Creek, and the *Lower Conglomerate* forms the slanting surface from the creek to the crest of the mountain on the south-east side.

On the side of the mountain at *Mr. John Shankles' mine*, in the S. W. corner of S. E. ¼ of S. 33, T. 5, R. 9 E., there is the following section:

SECTION AT MR. JOHN SHANKLES' MINE, IN THE S. W. CORNER OF S. E. ¼ OF S. 33, T. 5, R. 9 E.

(8) CONGLOMERATE (*Lower*); bluff, 30 to 40 ft.
(7) COAL; in thin seams in the rocks, 0 to 4 in.
(6) *Sandstone;* very hard, 6 to 12 in
(5) COAL; with irregular streaks and spots of bituminous sandstone and shale, 8 to 18 in.
(4) *Shale*, 1 ft. 4 in.
(3) COAL; streak.
(2) *Fire Clay;* visible, 3 ft.
(1) *Debris.*

The conglomerate (8) is here full of pebbles. The dip is from 15° to 20° to N. W.

At the mouth of an old drift on the side of the mountain, in an out-crop of the *Cliff Seam* of coal, in N. W. ¼ of N. W. ¼ of S. 13, T. 5, R. 9 E., there is the following section:

SECTION IN N. W. ¼ OF N. W. ¼ OF S. 13, T. 5, R. 9 E.

(9) CONGLOMERATE (*Millstone Grit*), 15 ft.
(8) *Debris*; probably principally shale, 50 ft.
(7) *Shale*; cover to drift.
(6) COAL, 9 in.
(5) *Shale*, COAL; coal in thin streaks in shale, 1½ in.
(4) COAL, 2 in.
(3) *Shale*, COAL; shale clayey and coal in thin streaks in shale, 3½ in.
(2) COAL, 4½ in.
(1) *Clay*; visible, 5 in.

This coal is said to have gotten better as gone into.

To the north-east of this point, the edge of this mountain is high and bluffy though not so high, by from 200 to 300 feet as Lookout Mountain just across the narrow valley. To the north east of here the two conglomerates form, on all the prominent points, each a row of bluffs.

Along the road up the mountain near Sulphur Springs, at Brown's Gap in S. E. ¼ of S. 9, T. 4, R. 10 E., there shows the following section:

BROWN'S GAP SECTION.

(4) CONGLOMERATE (*Upper*), 75 to 80 ft.
(3) *Debris*, 20 ft.
(2) COAL SMUT; thin.
(1) *Debris*; loose conglomerates and sandstones with some bedded shales and clays, believed to hide the LOWER CONGLOMERATE, to bench, 300 to 325 ft.
Mountain Limestone; about, 375 ft.

Between the above gap and the Georgia line, the coal under the Lower Conglomerate, the *Cliff Seam*, is said by some to show three feet in thickness, but to carry partings of slate. By others, the coal of this neighborhood is said to

bo only from 12 to 14 inches in thickness. The S. E. crest of the mountain to the north-east of Brown's Gap is of the Upper Conglomerate, which is here very massive and is frequently nothing more than a mass of pebbles. It forms in places great naked or glady spots and is in waves from north-west to south-east. The mountain here, over large areas, is hollow as can readily be told by the resounding sound in walking over it. On top of the mountain in the N. E. ¼ of S. E. ¼ of S. 32, T. 3, R. 10 E., there is an out-crop of coal with fire-clay, which is believed to be over the Upper Conglomerate.

Fox Mountain, principally in Georgia, is an offshoot of Raccoon Mountain, with "Deer Head Cove" between them. The Coal Measures of this mountain are not connected with those of Raccoon Mountain, the surface rocks of the narrow gap or connecting link between them being of the uppermost Mountain Limestones. Fox Mountain is surrounded almost entirely, if not entirely, by two lines of bluffs formed by the Upper and Lower Conglomerates. These bluffs plainly show at a distance that their strata are in long waves from north-east to south-west, as well as from north-west to south-east. The top of the mountain is of the trough of one of the great waves from north-west to south-east. Under the lower line of bluffs or the Millstone Grit of this mountain, there are said to be out-crops of coal (the *Cliff Seam*) from 8 to 12 inches thick. The cedars appear to extend about one-third of the way up the mountain.

B. COAL MEASURES OF LOOKOUT MOUNTAIN—On this mountain, from Little Wills Valley, the Lower and Upper Conglomerates are seen forming on all the prominent points each a line of bluffs. The bluffs of the lower line or of the Lower Conglomerate are usually much the higher. Between the prominent points, the Upper Conglomerate usually crops back on the mountain and does not show from the valley. These lines of bluffs as well as thin strata are in long flat waves from N. E. to S. W. Their strata slope away from the edge of the mountain, or to the south-east, and as the dip along the south-east edge of the mountain is also away from the

edge of the mountain, or to the north-west and somewhat steeper, the edges of the mountain are its most elevated portions and head. The mountain is an irregular synclinal trough.

The structure of this mountain can be seen from an inspection of Section I, though in places to the north-east and south-west of the line of the above section the super-conglomerate measures are much thicker, and include several thin seams of coal. The following is a general section of the thicker measures of Lookout Mountain:

GENERAL SECTION OF THE THICKER COAL MEASURES OF LOOKOUT MOUNTAIN.

Sandstones; often shaly and slabby, 0 to 75 ft.
(8) COAL, 4 in. to 2 ft.
Shales, 4 to 10 ft.
(7) COAL, 0 to 0 ft. 10 in.
Shale, 25 to 30 ft.
(6) COAL, 3 in. to 1 ft 8 in.
UPPER CONGLOMERATE, 50 to 60 ft.
(5) COAL, 0 to 1 ft.
Shales, 0 to 9 ft.
(4) COAL (Sewanee in Fort Payne Mines) from 2 ft. to 3 ft. 6 in.
Shales, Sandstones, 35 ft. to 40 ft.
LOWER CONGLOMERATE, 25 ft. to 100 ft.
(3) COAL, 0 to 2 ft.
Sandstones, *Shales*, 40 to 50 ft.
(2) COAL (Dade, Eureka), 1 ft. 6 in. to 2 ft. 8 in.
Fire Clay; full of fossil stems, 3 ft. to 20 ft.
(1) COAL, 6 in. to 1 ft. 6 in.
Sandstones, *Shales*; about 250 ft.
MOUNTAIN LIMESTONE.

At the Eureka Old Mines, there is something like the following out-crop:

EUREKA OUT-CROP.

(6) CONGLOMERATE (*Upper*); forming a bluff some 250 yds. back from top of mountain, 20 ft.
(5) *Debris*, (most probably covers coal) 60 to 70 ft.
(4) CONGLOMERATE (*Cliff Rock*); 40 to 50 ft.
(3) *Debris*, (most probably covers coal) 40 to 45 ft.
(2) COAL (*Dade Seam*); said to be from 1 to 7 ft.
(1) *Debris*; perhaps a coal seam in upper part, to foot of mountain, 800 ft.

The coal (2) was hid at the time visited, though it is said to be very variable in thickness and to have a slate parting near its centre. These mines consisted of two drifts about 150 yards apart. The mouth of the more north-eastern drift is some ten feet the lower and the mines are drained through. it. The coal was let down the mountain by a drum and incline. The Upper Conglomerate is here full of pebbles and dips 10° to 15° to S. E. The edge of the mountain from here on to Valley Head is very high and shows most of the way, from the valley, two lines of bluffs.

On the brink of the mountain near the center of the S. E. ¼ of S. 21, T. 5, R. 10 E., is the *tripod rock*. This rock is some 15 feet higher than the mountain, and stands on three legs, hence its name. The legs are however only a few feet in length. It stands right on the brink of the mountain, which is here more than 800 feet higher than Valley Head in the valley below. The rock on top is some 8x12 feet broad, and from its top the view up and down the valley is grand. Fort Payne, 12 miles down the valley, can easily be seen with the naked eye. On top it is worn into pot-holes. It is of the Lower Conglomerate or Millstone Grit and shows finely the effects of weathering.

On the side of the mountain a short distance to the south-west of the *tripod rock*, and just to the north-east of *Mentone*, on the brink of the mountain in the N. W. ¼ of N. E ¼ of S. 28, T. 5, R. 10 E., are two test pits dug into the *Dade or Eureka seam* of coal, (4) of the Etna Section. At these pits there is the following section:

MENTONE SECTION IN
N. W. ¼ OF N. E. ¼ OF S. 28, T. 5, R. 10 E.

(10) CONGLOMERATE (LOWER).
(9) *Debris*, 15 to 20 ft.
(8) *Shale;* visible, about 12 ft.
(7) COAL, 10 in.
(6) *Shale*, 2 in.
(5) COAL; shaly, 4 to 5 in.
(4) COAL, 1 ft. 2 in. to 1 ft. 3 in.
(3) *Clayey Shale*, 6 in.
(2) COAL; streak.
(1) *Fire Clay*; underbed.

Lower down the mountain, 25 to 30 feet under the outcrop of the above seam of coal is a fine chalybeate spring.

From Mentone there is a gradual slant in the surface to the south-east to the West Fork of Little River about one mile distant. The Lower Conglomerate even does not set in here for several hundred yards to the south-east of the brink of the mountain, and the Upper Conglomerate does not make its appearance for some three miles to the south-east or until a point about half-way between the West Fork and East Fork of Little River is reached.

From just under the Upper Conglomerate on Brush Creek in the S. W. corner of S. 1, T. 6, R. 10 E., there is an out-crop of a seam of coal which is most probably identical with the Sewanee Seam, or (6) of the Etna Section.

At this out-crop there is about the following section :

SECTION ON BRUSH CREEK IN S. W. CORNER OF S. 1, T. 6. R. 10 E.

(6) CONGLOMERATE (UPPER).
(5) *Shale*, 0 to 3 ft.
(4) COAL, 8 in.
(3) *Clayey Shale*, 1 in.
(2) COAL, 11 in.
(1) *Fire Clay*; underbed.

The dip is about 10° to S. E.

Only a few feet to the south of the out-crop of this section, just across Brush Creek from it, an out-crop of coal is said to have been dug down into to a depth of four feet without getting through it. These out-crops are of the same seam of coal and the seemingly much greater thickness of latter is probably due to a folding or doubling of the strata.

In the S. W. ¼ of S. 31, T. 5, R. 11 E., there is a reported out-crop of coal from 14 to 15 inches in thickness. It is doubtless of the same seam as the coal of the last section, or (6) of the Etna Section, as are most probably the coals outcropping under the bluff along the East Fork of Little River in S's 23, 27, & 34, T. 6, R. 10 E., which are reported to be from 10 to 16 inches in thickness.

On the brink of the mountain about one-half mile to the south-west of Mentone, there is the following out-crop of the Eureka or Dade seam of coal, (4) of the Etna Section.

SECTION ONE-HALF MILE SOUTH-WEST OF MENTONE.

(8) CONGLOMERATE (LOWER).
(7) *Debris*; perhaps, 10 to 15 ft.
(6) *Flagstones*; visible, 6 to 8 ft.
(5) Shale, 10 ft.
(4) COAL, about, 10 in.
(3) *Shale*; parting 1½ in.
(2) COAL; with a thin slaty parting near the center, about 2 ft.
(1) *Fire Clay*; underbed, visible 3 ft,

The Lower Conglomerate here sets in several hundred yards to the south-east of the brink of the mountain. The dip of the above coal is about 10° to S. E.

The *Upper Falls* of Little River are on the West Fork in the N. E. ¼ of N. E. ¼ of S. 4, T. 6, R. 10 E. They are made up of first, a fall of about 10 ft. into a small shallow pool, that is said to have been formed or washed out within the last 30 years, and then a steep cascade from 25 to 30 feet to the big perpendicular fall of about 50 feet. The upper strata of these falls are of the Lower Conglomerate. The bluffs on either side of the river just below these falls are from 75 to 80 feet in height. These bluffs extend down the river about one mile, though the bluff on the south-east side leaves the river in about one-fourth mile below the falls, and there are then along the river on this south-east side some good bottom lands. Some four miles below the *Upper Falls* there is said to be on the West Fork a small fall of from 6 to 8 feet.

On the edge of the mountain opposite Price's Switch or Cordell's P. O., four miles south-west of Valley Head, there is no appearance of either conglomerate, though the Coal Measures are some 200 feet thick. The Lower Conglomerate occurs here either as a sandstone, or back from the brink of the mountain some 65 to 70 feet from the top of the mountain, is a strong chalybeate spring which probably has its origin in a coal seam, and some 15 feet lower is a very

black shale that has been dug into for coal, perhaps of the horison of the *Dade or Eureka Seam.*

Opposite the water tank, on the side of the mountain near the center of the N. E. ¼ of S. 34, T. 6, R. 9 E., there is an old coal mine or drift. At this drift, the mountain shows about the following section:

SECTION IN N. E. ¼ OF S. 34, T. 6, R. 9 E.

(12) CONGLOMERATE (*Upper*), 25 ft.
(11) *Debris*, 15 ft.
(10) *Sandstone*; massive, doubtless the *Cliff Rock*, 15 to 20 ft.
(9) *Shale*, 40 ft.
(8) COAL (*Dade or Eureka Seam*), 2 ft. 6 in.
(7) *Shale*; with kidney ore just under coal, 110 ft.
(6) *Flagstones*, 25 ft.
(5) *Shale*, 25 ft.
(4) *Debris*; with some bedded shales, 200 ft.
(3) *Limestone*; visible, 15 ft.
(2) *Debris* (LaGrange Sandstone, etc.,) 90 to 100 ft.
(1) *Debris*; Mountain Limestone, to foot of mountain, 125 ft.

The above coal (4) on the out-crop was about 2 ft. thick, but within a few feet thickened to 2 feet 6 inches.

Nearly two miles to the south-west, at the Beeson Gap in the S. W. ¼ of N. W. ¼ of S. 3, T. 7, R. 9 E., there occurs something like the following section:

BEESON GAP SECTION, IN S. W. ¼ OF N. W. ¼ OF S. 3, R. 9 E.

(12) CONCLOMERATE (UPPER).
(11) *Debris*; hiding one or more seams of coal, about 60 ft.
(10) CONGLOMERATE (LOWER); about 25 ft.
(9) COAL; streak.
(8) *Sandstone*; bluish and hard, 25 ft.
(7) *Debris*; about 25 ft.
(6) *Sandstone*; about 4 ft.
(5) COAL; on out-crop, 2 ft. 2 in.
(4) COAL; slaty, 4 in.
(3) *Fire Clay*; full of fossil impressions, 3 to 14 ft.
(2) COAL; reported, 6 in. to 1 ft. 6 in.
(1) *Debris.*

The coal streak (9) of the above section is exposed in the deep railroad cut, on the brow of the mountain, in a hard

spongy ferruginous conglomerate streak that is from 0 to 12 inches thick. This coal thickens out into a seam, which was struck at the bottom of a well not over 75 yards to the north-east of the exposure in the cut. The coal (5) has been drifted into for something over 100 yards. On the out-crop, it is about 20 feet over the coal (2) but it is said to approach or dip to (2) until in 100 yards within they are not over 3 feet apart. The clay (3) is being mined here and used in the pottery and fire clay works at Fort Payne. It is very hard and mines in large lumps, but on weathering it crumbles and becomes very plastic on wetting. As a matrix for siliceous material, it makes a very good fire brick. It is full of fossil stem and leaf impressions. The Debris (11) of the above section hides one or two seams of coal as they are seen occupying that position within two miles of this locality, The *Upper Conglomerate*, (12) of the above section, sets in some 200 yards to the south-east of the brow of the mountain; it is very massive and full of pebbles and forms glady places that are sometimes naked and are sometimes covered with a luxuriant growth of grasses. The *Lower Conglomerate*, (10) of the above section is here comparatively thin but in a short distance to the south-east, it becomes very thick and massive. In places it is nothing more than a white quartzose sandstone. The sandstone (8) of the above section is also like a white quartzite in places. The Lower Conglomerate on the brow of the mountain at the above gap is about level, but in about 100 yards to the south-east it curves to a dip of some 30° to the south-east. The dip down on the N. W. side of the mountain is 10° to 15° to S. E. The surface, in a general way, slopes from near the gap some four miles to the south-east to where the strata, occupying the lowest part of the trough of the basin, are about flat.

The coal mines of the Fort Payne Coal and Iron Company, in the N. E. ¼ of S. 23, T. 7, R. 9 E., consisted at the time visited, in July 1890, of five drifts. At these drifts there is something like the following section:

SECTION AT THE FORT PAYNE C. & I. CO. MINES, IN THE S. E. ¼ OF N. E. ¼ OF S. 23, T. 9, R. 9 E.

(6) CONGLOMERATE (UPPER).
(5) *Shale* 0 to 6 ft.
(4) COAL 0 to 1 ft.
(3) *Shale* 0 to 9 ft.
(2) COAL 2 ft. to 3 ft. 6 in.
(1) *Fire Clay.*

The coal (2) of this section is the *Sewanee Seam*, (6) of the Etna Section. In the above drifts, it is in waves from N. W. to S. E. The thicker portions of it are in the troughs or *marshes* of these waves. The thickening and thinning in the seam take place mostly in the top of the seam though some changes do occur in the bottom. It has in it, most commonly near the bottom, some thin irregular seams of slate. It is in places jam up against the Conglomerate (Upper) while in other places it is separated from the Conglomerate by as much as 15 feet of shale with a seam of coal that varies from 0 to 12 inches in thickness. The fire clay underbed, (1) of the above section, appears in places to change to a hard clayey looking sandstone that is full of fossil stem and leaf impressions and has no cleavage planes.

Nearly one mile to the east of the above mines, or in the S. E. corner of S. W. ¼ of N. E. ¼ of S. 24, T. 7, R. 9 E., is the *Lowery Coal Bank.* At this bank there is a drift into the following seam of coal:

OUT-CROP AT THE LOWERY COAL BANK, IN THE S. E. CORNER OF S. W. ¼ OF N. E. ¼ S. 24, T. 7, R. 9 E.

(4) CONGLOMERATE (UPPER).
(3) *Sandstone*, in ledges, 6 to 8 ft.
(2) COAL; with thin slate partings, 1 ft. 7 in.
(1) *Fire Clay*; visible 4 ft.

Within the drift, the coal (2) is said to be 2 feet 2 inches thick. This coal is of the same seam as the coal of the Fort Payne C. & I. CO. Mines, but the thin coal seam that is in

places between that coal and the Upper Conglomerate does not occur here. The dip here is about 10° to S. E.

This same seam of coal is reported to crop out in the N. E. ¼ of N. E. ¼ of S. 24, T. 7, R. 9 E. Some 40 feet above it, in the shale over the Upper Conglomerate, is a thin seam of coal, as shown by out crops in several places. Some 40 to 45 feet higher is another seam of coal which, in the out-crop near Mr. Geo. Baker's, in the S. W. ¼ of S. 7, T. 7, R. 10 E., is only 6 inches thick, though at the back of the drift, driven in on this out-cropping about 10 feet, the coal is from 12 to 15 inches thick. This coal out-crop is under a bluff of sandstone that is massive in the upper part and flaggy near the bottom. The underbed is a bluish fire clay that is visible to a thickness of about 3 feet.

The Lower Conglomerate forms the bed of the river in S's 16, 17 & 20, T. 7, R. 10 E., and out in the hills, some 60 feet above the bed of the river, are out-crops from 8 to 12 inches in thickness of the coal seam under the Upper Conglomerate, the Sewanee Seam or (6) of the Etna Section.

The Lower Conglomerate on Yellow Creek about ½ mile above its mouth or in the N. W. ¼ of S. 30, T. 7, R. 10 E., shows a thickness of some 50 feet. It is here very massive and forms a bluff along the creek and a fall in the creek of 15 to 20 feet. The Conglomerate here at this fall appears to be almost level. Just under this Conglomerate, or in its bottom strata, is a very irregular seam of coal, the *Cliff Seam*, (5) of the Etna Section. This seam of coal crops out about low water level on the west bank of Little River just above the ford in the southern part of the N. E. ¼ of S. 30, T. 7, R. 10 E., and also just below the mouth of Yellow Creek, or above "The Falls," in the eastern part of the S. W. ¼ of S. 30, T. 7, R. 10 E. It is a very irregular seam; in places it is nothing more than the irregular streaks of coal through a very hard conglomerate and in other places it bulges out into pockets of coal of as much as two feet in thickness. The coal of these pockets is as a general thing very hard and of very fine quality. This irregular seam of coal also shows in the east bank of the river just below "*The Falls*," and about even

with the top of "*The Falls.*" This last out-crop is, however, in Cherokee county, as the river is here the county line.

"*The Falls*" are therefore over strata that are just under the Cliff Seam of coal or just under the Lower Conglomerate. "*The Falls*" are about 40 feet in perpendicular height, and the strata, with the exception of the lower four to five feet, are of sandstones. The upper of these sandstones is massive while the lower ones are slabby and are false bedded. Just under these slabby sandstones, or some 35 feet under the Cliff Seam, and some four feet above the pool just below "*The Falls*," is a seam of coal with a hard fire clay underbed. This seam of coal at "*The Falls*," is from 8 to 14 inches in thickness, though, in the gorge of the river several miles below, it is nearly 2 feet in thickness. The fire clay underbed is very hard and is very full of fossil leaf and stem impressions. This seam of coal corresponds, it is believed, to the Dade or Eureka Seam, (4) of the Etna Section. The strata in the bluffs just below "*The Falls*" are in waves from north-east to south-west.

Opposite Fort Payne, or on the side of the mountain just to the south east of the city, the sub-conglomerate measures appear to be about 300 feet in thickness. The two conglomerates here, along the road, are back respectively about one-fourth and one-half mile from the brow of the mountain.

On the side of the mountain about opposite to or above *Manitou Cave*, in the S. W. ¼ of S. 17, T. 7, R. 9 E., there is reported to be the following section:

SECTION IN S. W. ¼ OF S. 17, T. 7, R. 9 E.

(6) *Bluff* (most probably the *Lower Conglomerate*).
(5) *Debris, Shales*; about 25 ft.
(4) COAL, 1 ft. 3 in.
(3) *Fire Clay*, 9 ft.
(2) COAL, 1 ft. 5 in.
(1) *Fire Clay.*

These coals are probably of the Dade or Eureka Seam, (4) of the Etna Section, and, as at Beeson Gap some 3 miles to the north-east, would probably come close together on being drifted into.

On the side of the hill in the N. E. ¼ of S. W. ¼ of S. 2, T. 9, R. 8 E., is an out-crop of coal that appears to be 8 inches thick, and in the S. ½ of N. E. ¼ of S. 3, T. 9, R. 8 E., there is a coal out-crop that is reported to be 14 inches thick.

In the S. E. ¼ of S. 2, T. 9, R. 8 E., the strata are in waves from N. W. to S. E. In S's 3 & 10, T. 9, R. 8 E., the Upper Conglomerate on the divides between the creeks and branches form many glady places and are often naked. A seam of coal about 6 inches thick is said to have been dug into in the S. E. ¼ of S. E. ¼ of S. 20, T. 9, R. 8 E.

A great deal of coal has been raised by "surface-digging" from the out-croppings of a seam about 18 inches thick along a branch in the S. W. ¼ of S. W. ¼ of S. 1, T. 10, R. 7 E. In one of the pits, the coal is said to have been 27 inches thick. This coal is probably (8) of the Etna Section. A few feet under it are some massive sandstones, and 8 to 10 feet above it there is reported to be a seam of coal about 4 inches thick.

In the N. W. ¼ of S. 1, T. 10, R. 7 E., are some coal diggings into a seam that is said to be from 9 to 12 inches thick. This coal is most probably of the same seam as that of the last mentioned diggings.

8. COAL MEASURES OF CHEROKEE COUNTY.

The Coal Measures of Cherokee county are all of an elevated plateau. They are of one body, and are confined to the top of Lookout Mountain. They comprise some 150 square miles, and from the south-east half of the shallow tray slope depression or cynclinal trough that makes the top of Lookout Mountain. The north-western boundary of these measures is in great part formed by the East Fork of Little River which is also the county line; while their south-eastern boundary is just under or to the south-east of the south east brow of the mountain. They are of course most elevated along the south-east brow of the mountain which is from 400 to 700 feet above Little River and from 900 to 1100 feet above the Coosa River. The dip of the strata, with the exception of that due to waves, is all to the north-west. It is greatest along the south-east edge of the measures where it is often quite steep, and gradually gets less to the north-west until finally along the county line on the north-west, near the center of the synclinal trough, the strata are about level.

Great natural exposures and sections of almost the full thickness of the Coal Measures of this county are to be seen in the deep ditch-like gulches and high perpendicular falls along Little River and Yellow Creek. For a general description of these exposures and of the Coal Measures of this county, see that of the Plateau Region in the *Introduction.*

DETAILS.

Near the State line in this county, the Coal Measures appear to be about 300 feet thick and to include from four to five thin seams of coal. At least one-half of this

thickness, with two of the coal seams, is of the sub-conglomerate measures. The coal out-crops on the mountain are usually from 6 to 8 inches in thickness, though, under a bluff along the river in S's 23, 27, & 34, T. 6, R. 10 E., there are out-crops of a seam of coal that is reported to be from 14 to 16 inches in thickness. This coal seam most probably corresponds to she *Sewanee Seam*, (6) of the *Etna Section*.

In places, there are out-crops of beautiful flagstones that are well suited for paving, etc.

The Lower Conglomerate forms the bed of the river in S's 16, 17 & 20, T. 7. R. 10 E., and 60 to 70 feet above the river are out-croppings of the Upper Conglomerate with a seam of coal under it.

Near the school-house in the S. E. ¼ of N. W. ¼ of S. 21, T. 7, R. 10 E., there is something like the following out-crop:

OUT-CROP IN S. E. ¼ OF N. W. ¼ OF S. 21, T. 7, R. 10 E.

(6) CONGLOMERATE, (UPPER).
(5) *Sandstone*, COAL; the coal in streaks in the sandstone, 2 ft.
(4) *Shale;* very hard 5 ft.
(3) COAL, 8 to 10 inches.
(2) *Debris*, 15 to 20 ft.
(1) COAL; reported 1 ft. 8 in.

The dip is 10° to 15° to N. W. These coals, (1) and (3), correspond to (6) and (7) of the Etna Section.

About ¼ mile to the S. E. S., is the *Bowman coal bed.* At this bed the coal is from 8 to 12 inches thick. It is just under the Upper Conglomerate and has an underbed of fire clay. The dip here is also 10° to 15° to N. W. This coal is doubtless of the same seam as the upper coal of the last section.

Down on the side of the mountain in the S. E. ¼ of S. 28, T. 7, R. 10 E., is the Widow Kennedy coal bed. It is reported to be 20 inches thick. It is under the Lower Conglomerate and is probably the Eureka or Dade Seam, (4) of the Etna Section.

In the south-east bank of the river just below "*The Falls*" in the eastern part of the S. W. ¼ of S. 30, T. 7, R. 10 E., there is the following out-crop:

OUT-CROP AT "THE FALLS," IN THE EASTERN PART OF S. W. ¼ OF S. 30, T. 7, R. 10 E.

(5) CONGLOMERATE (LOWER).
(4) COAL; irregular, in streaks and thick pockets, 0 to 2 ft.
(3) *Sandstones*; massive above, flaggy below, about 35 ft.
(2) COAL, 8 to 14 in.
(1) *Fire Clay;* hard and very fossiliferous, to level of water, about 4 ft.

The coal (4) is about even with the top of "*The Falls.*" It is a very hard coal and is of fine quality. The coal (2) is away back under a shelving rock. This shelving rock, for a few feet above the coal, is slabby and in places, false-bedded. It is also, as seen along the bluff, in waves from N. E. to S. W.

Farther down the river, in the N. E. ¼ of N. E. ¼ of S. 31, T. 7, R. 10 E., the coal (4) of the last section crops out in streaks and in pockets of over two feet in thickness. The changes from the thin streaks to the thick pocket, and back again to the thin streaks occur within a few feet. The gulch of Little River from "*The Falls*" on down for some ten miles to where it runs off the mountain resembles a huge newly cut ditch about one-fourth mile broad and from 200 to 400 feet deep. It is almost an impassible barrier for this whole distance, for one can descend into it on foot in only a few places, and that with difficulty. It doubtless, some miles above its mouth or before it reaches the edge of the mountain, extends down into sub-carboniferous strata. The country near it is comparatively level and in approaching it, through the under-brush, its nearness is not even suspected until the brink is reached, and the yawning chasm is almost beneath your feet. This sharpness of outline is due to the fact that the surface rock of the comparatively level country is the hard weather resisting Lower Conglomerate, and that this rock holds its own until the gulch is reached, when it suddenly breaks off in a perpendicular bluff of from 75 to 100 feet in height. There are other high bluffs in the gulch below this one, but they are not so uniform in height nor so persistent. This Lower Conglomerate forms

the large naked rock, called "*The Split Rock*," on the eastern brink of the gulf in the northern part of the N. E. ¼ of S. 11, T. 8, R. 9 E. This rock is so called from the fact that running through it in a north-east and south-west direction there is a split or crack that is some 100 yards long, about 2 feet 6 inches wide at the top and some 75 feet deep. This split at the north-east end is some 50 feet or more from the bluff, but gradually approaches it to the south-west and finally runs into it. It, the split, doubtless extends through the conglomerate and is most probably due to the conglomerate having been undermined along the bluff by weathering out of a softer underbed. Left unsupported the weight of this edge would of course tend to break or split it off from the supported portion, and, were there a joint in the rock near the unsupported edge and running somewhat with the bluff, and did the undermining amount to only a few feet in thickness, there would be a splitting along the joint, as in the above instance. The top of this rock is weathered into *sand holes*, that often resemble the impressions of large horse-tracks.

Just below or to the S. W. S. of the *split rock*, there occurs something like the following section:

SPLIT ROCK SECTION, IN N. E. ¼ OF S. 11, T. 8, R. 9, E.

(6) *Conglomerate* (*Lower*) 75 to 100 ft.
(5) DEBRIS, SANDSTONE; about 125 ft.
(4) *Slaty Sandstone*, 0 to 1 ft.
(3) COAL, 1 ft. 8 in. to 1 ft. 10 in.
(2) COAL; slaty, 4 to 6 in.
(1) *Debris*; to level of water, about 100 ft.

The Cliff Seam, if it is here, is hidden by the *Debris* (5). The coal (3) corresponds to the Dade or Eureka Seam, (4) of the Etna Section. This out-crop of coal is soft and is rusty or stained red along the seams. The dip appears to be about 10° to the W. S. W. This dip is doubtless due to waves from N. E. to S. W.

The Upper Conglomerate does not occur along here to the south-east of the river or in this county.

The coal (3) of the last section shows also on the south-east side of the mountain in the S. W. ¼ of S. 13, T. 8, R. 9 E.

OUT-CROP IN THE S. W. ¼ OF S. 13, T. 8, R. 9 E.

(7) *Sandstone;* visible 5 to 6 ft.
(6) COAL, 1 ft. 2 in.
(5) *Shale*, 2 to 3 in.
(4) COAL, 3 in.
(3) *Shale*, 3 in.
(2) *Mother of* COAL, 8 in.
(1) *Fire Clay*, 3 ft.

The dip is 15° to 20° to N. W.

The sub-conglomerate Coal Measures appear here to be some 200 feet in thickness.

About one-half mile to the north-west of the south-east crest of the mountain, there is near Mr. Jas. S. Jackson, in the N. ¼ of N. E. ¼ of S. 8, T. 9, R. 9 E., an out crop of the Cliff Seam of coal, (5) of the Etna Section. In this out-crop the coal is in the lowest strata and just at the base of the Lower Conglomerate. It is in places in thin streaks and in other places in pockets of perhaps 2 or more feet in thickness. The changes from the thin streaks to the thick pockets and back again to the thin streaks are quite sudden and most often occur within a few feet. The coal is very hard and of the very best quality. Near this coal out-crop, there is scattered over the surface a great deal of sandy or siliceous spongy limonite ore. This ore appears to have come from a stratified seam of several feet in thickness that occupies almost the indentical Geological position of the *Cliff Seam* of coal. This ore has doubtless been formed by the oxidation of carbonates or sulphides. This coal and ore out-crop seems to be on the crest of a wave from N. W. to S. E.

On a prong of Wolf Creek and some 20 feet above it, there is in a bluff of hard shales in the S. W. ¼ of S. 12, T. 9, R. 8 E., an out-crop of a seam of coal from 6 to 8 inches in thickness. The dip is about 10° to S. E. The strata here are in long gentle waves from N. E. to S. W., and in a short

distance to the north are seen to be in waves from N. W. to S. E.

Some coal is said to have been raised from surface diggings from an out-crop in the N. W. corner of S. 5, T. 10, R. 8 E. This coal probably belongs to (8) of the Etna Section.

In the N. W. corner of S. 7, T. 10, R. 8 E., there are the out crops of two seams of coal about 10 feet apart. These out-crops are only 3 to 4 inches each in thickness, and most probably belong to (9) and (10) of the Etna Section.

In the back part of a *rock-house*, under a conglomerate, in the N. W. ¼ of N. E. ¼ of S. 7, T. 10, R. 8 E., there is a pocket of coal about 5 feet long and 18 inches thick. In the line of this pocket of coal, on each side of it, are thin streaks of coal in a hard white sandstone like quartzite. This sandstone is all crumpled up. The dip appears to be 15° to 20° to the N. E. though this is doubtless due to the N. E. and S. W. wave in the strata. The strata here are also in waves from N. W. to S. E. and an irregular trough of these waves forms a bench up on the side of the mountain. The above coal out-crop is near the bottom of this trough. The conglomerate as it disappears along the north-west edge of this trough or bench has a dip of about 45° to the N. W.

9. THE COAL MEASURES OF ETOWAH COUNTY.

The Coal Measures of Etowah County are partly on Lookout Mountain and partly on Raccoon Mountain. Those of Lookout Mountain comprise the south-west end of the mountain and are some 50 square miles in extent. They with their high north-west and south-east rims show most plainly that they occupy as cynclinal trough. They are limited on the south-west by a south-east and north-west fault that brings lower cambrian strata in contact with them. The displacement along this fault is very great; it is perhaps as much as 10,000 feet. In Alabama the displacements along the cross faults, or those that seen in any other than a general north-east and south-west direction are comparatively small.

The Coal Measures of Raccoon Mountain in this county are nearly separated into two parts by Bristow's Cove, or the north-east end of Murphree's Valley. They once extended over this cove or valley. They were, however, pushed up along this cove or valley into an anticlinal ridge and afterwards the ridge was removed and the present valley cut out by denudation. They are still continuous around the head of the cove or valley, and, as they now stand, cover some ninety square miles. The portion between Bristow's Cove or Murphree's Valley on the north-west and Big Wills Valley and Greasy Cove on the south-east is the north-east end of what is known as *Blount Mountain.* It is from two to three miles wide and occupies a synclinal trough with its south-east edge much higher than its north-west edge. The dip is to the north-west to within a short distance of the north-west edge when it suddenly becomes very steep to the south-east and then perpendicular. The north-west edge is for the most part a perpendicular wall of the conglomerates etc., near the base of

the measures. Just to the north-west edge of this perpendicular wall, or the perpendicular strata, and between them and the cove or valley is an immense fault. There is also a fault, a much smaller fault in many places, at least, just to the south-east of the perpendicular strata.

The Coal Measures of this county answer very well to the general descriptions given in the *Introduction.*

DETAILS.

A. THE COAL MEASURES OF LOOKOUT MOUNTAIN.—The south-east edge of Lookout Mountain in this county does not appear so high and does not rise up so abruptly as farther to the north-east. This is because the sub-conglomerate and the upper sub-carboniferous measures crop out here as a narrow strip of broken country along the south-east edge of the mountain, or as spurs, etc., of the mountain. The Upper Conglomerate at the Lay Springs in the W. ½ of N. W. ¼ of S. 13, T. 10, R. 7 E., forms a bluff some 75 feet in height, and from it flows a group of several fine chalybeate springs. The water from each of these springs forms a stream of perhaps an inch in diameter, and is cold and strongly chalybeate. These springs are much more deserving than many that form popular resorts.

There is a reported coal out-crop in the S. W. ¼ of S. W. ¼ of S. 12, T. 10, R. 7 E., and in the W. ½ of N. W. ¼ of S. 12, T. 10, R. 7 E., is Mr. W. L. Watson's coal bed. The average thickness of this coal is about 10 inches, though it is said to have been 17 inches thick in one place. It is covered by a very hard shale that is full of fern impressions. These impressions are so numerous as to show on every fresh surface, though the shale be split into laminæ of no greater thickness than a sheet of writing paper. There is in this shale, resting vertically on the coal seam, the fossil trunk of a tree from 6 to 10 inches in diameter. Surrounding the stump, between it and the shale, is a thin sheet of coal. Some two feet under this coal seam is a muddy or clayey looking sandstone, without any cleavage, that is also full of fossil stem and leaf impres-

sions. The strata are here in waves from N.W. to S.E. Under this coal, 30 to 40 feet, is reported to be another seam of coal, and above it, perhaps some 50 feet, there is a coal out-crop, in the road, from 3 to 4 inches in thickness. These three seams of coal probably correspond to (8), (9) and (10) of the Etna Section.

There are reported out-croppings of coal along the western boundary of the S.W. ¼ of N. E. ¼ of S. 10, T. 10, R. 7 E., about 18 inches in thickness, and of a thin seam in the N. E. ¼ of N. W. ¼ of S. 10, T. 10, R. 7 E., and of a seam, of unknown thickness, in Black Creek in the S. W. ¼ of N. W. ¼ of S. 11, T. 10, R. 7 E.

Along the road in S's 16, 19, 20, 30 & 31, T. 10, R. 7 E., are out-croppings of two thin seams of coal from 6 to 10 feet apart. One of these out-crops probably of the lower seam, in the S. W. ¼ of N. E. ¼ of S. 16, T. 10, R. 7 E., shows a thickness of 6 to 8 inches. About one-half mile farther to the south-west, or in the N. E. ¼ of S. W. ¼ of S. 16, T. 10, R. 7 E., there is along the road something like the following section:

SECTION IN N. E. ¼ OF S. W. ¼ OF S. 16, T. 10, R. 7 E.

(5) *Shale*; hard.
(4) COAL; out-cropping, 6 in.
(3) *Shale*; hard 6 to 8 ft.
(2) COAL; out-cropping, 2 ft. 6 in.
(1) *Shale*; clayey, 4 in.

About one-half mile still farther down the road, these two coal seams again make their appearance. In these last out-crops, the two coals are about 10 feet apart; the thickness shown here of the upper seam is about 4 inches, and of the lower seam about 6 inches. The coal seams are doubtless thicker than these surface out-crops. Coal has been dug in open pits from an out-cropping in the S. W. ¼ of S. W. ¼ of S. 16, T. 10, R. 7 E., that is said to reach a thickness of 16 inches, and from an out-cropping in the N. E. ¼ of N. E. ¼ of S. 20, T. 10, R. 7 E., where it is said to be 10 inches thick. These last two out-croppings are believed to be of a seam that is some 30 feet under the lower of the above two seams that

crop out along the road. These three seams most probably correspond to (8), (9) and (10) of the Etna Section.

Along the road on the side of a hill in the W. ½ of S. W. ¼ of S. 20, T. 10, R. 7 E. there is the following out-crop:

OUT-CROP IN THE W. ½ OF S. W. ¼ OF S. 20, T. 10, R. 7 E.

(6) *Shales, Flagstones;* the shales are heavy bedded, and have in them seams of flagstones, 15 to 20 ft. 0 in.
(5) *Clayey Shale;* soft, 6 to 8 in.
(4) *Black Slaty Shale,* 3 in.
(3) COAL, 10 in.
(2) *Fire Clay.* 5 to 6 in.
(1) *Shales, Flagstones;* seams of flagstones in the shale, about 10 ft.

The dip here is 6° to 8° to S. E. though the strata are in waves from N. W. to S. E. Across a depression, on the side of a hill some 75 yards to the S. W., there is an out-crop of coal about 4 inches in thickness that may be of a higher seam.

At this latter out-crop, the dip is 3° to 4° to N. W.

In the road some half-mile still farther to the south-west, or about in the N. E. ¼ of N. E. ¼ of S. 30, T. 10, R. 7 E., is another coal out-crop from 6 to 8 inches in thickness, and in the N. E. ¼ of N. E. ¼ of S. 31, T. 10, R. 7 E. there is a reported coal out-crop from 10 to 11 inches thick.

Still farther to the south-west on the side of the road near Mr. W. A. Morgan's, in the N. W. ¼ of S.W. ¼ of S. 31, T. 10, R. 7 E. are the out-crops of two seams of coal from 4 to 6 feet apart. The upper of these two seams appears to be the thicker, and it, as dug through in Mr. Morgan's well close at hand, is about 8 inches in thickness. Across a creek or branch just to the north-east of these last out-crops, the dip is from 8° to 10° to the S. E. Opposite to this point or just to the south-east of Greenwood station on the A. G. S. R. R. the sub-conglomerate measures are about 250 feet in thickness. The coal seams of these conglomerate measures have been thinning out to the south-west and along here are not over 18 inches in thickness at the greatest. The conglomerate bluffs capping the steep north-west side of the mountain show from the wagon road along Little Wills Val-

ley that they are in waves from north-east to south-west. These waves of the bluffs correspond to the waves of their strata, the high prominent points of the bluffs being the crests of the waves and the low places the troughs of the waves.

In the N. E. ¼ of N. E. ¼ of S. 36, T. 10, R. 6 E., a seam of coal about 6 inches thick crops out in a branch, and was dug through in a well, and in the N. ½ of S. E. ¼ of S. 36, T. 10, R. 6 E., is an out-crop of coal that has been dug from open pits and is most probably a foot or more in thickness. In the S. E. ¼ of S. E. ¼ of S. 36, T. 10, R. 6 E., is an out-crop of coal that is said to have been dug into to a depth of one foot without getting through it.

There are reported out-croppings of coal in S. E. ¼ of S. E. ¼ of S. 2, T. 11, R. 6 E., about 12 inches in thickness.

The above out-crop of coal are over the Upper Conglomerate and are of the three seams, (8), (9) and (10) of the Etna Section. In the N. E. ¼ of N. W. ¼ of S. 15, T. 11, R. 6 E., there is an out-crop of coal from 6 to 8 inches thick, and about one mile east and also one mile west of this locality there are said to be other out-crops of coal.

"*The Black Creek Falls*," in the S. W. ¼ of S. E. ¼ of S. 29, T. 11, R. 6 E., are over the *Lower Conglomerate*, (5½) of the Etna Section. These falls have a perpendicular height of about 75 feet and present, especially when the creek is up, a grand and beautiful sight. They are in the shape of a semi-circle and have under them an immense *rock-house** that extends from 50 to 75 feet under the falls or into the bluff. The rocks in the lower part of this bluff, in the *rock-house* under the falls, are somewhat flaggy and are in places false-bedded; those in the upper part of the bluff are massive, and along the creek, above the falls are naked over considerable areas, and show, along the joints, crevices a few feet in width and from 50 to 60 feet in depth. These rocks have a general dip of 6° to 8° to the N.W. and are in gentle waves from N. E. to S. W. The deep gulch just below the falls is some 75 yards broad. This gulch, however, does not extend very far down the creek, as the rocks, the Lower Conglomerates, which

*The spaces under overhanging cliff are called "rock houses." E. A. S.

form its perpendicular sides, soon dip below the surface, and there is formed along the creek and center of the mountain a little basin in which are exposed three seams of coal. The creek below the falls is sluggish. The dip into this little basin as shown by the coal out-crops on the N. W. side is some 15° to the S. W. The basin on the south-west side is ended abruptly by a fault or by the almost perpendicular strata along the line of fault, that cuts off or ends the mountain or Coal Measures on the south-west, and on the N. W. and S. E. sides, it has dips which are nothing more than those that are due to the inclinal or trough shape of the mountain, and which, in the bluffs along the crests of the mountain, where they are greatest, are respectively from 30° to 35° to S. E. and from 10° to 15° N.W. The coals of this little basin are about as in the following section:

OUT-CROPS ALONG BLACK CREEK, IN THE N. E. ¼ OF S. 32, T. 11, R, 6 E.

(7) *Measures;* principally shales, perhaps to surface 30 to 50 ft.
(6) COAL; from 6 to 24 inches in thickness, will average about 1 ft 6 in.
(5) *Measures;* fire clay and shales, about 10 ft.
(4) COAL, 5 in.
(3) *Measures;* about 30 ft.
(2) COAL; variable, 4 in to 1 ft. 8 in.
(1) *Measures.*

The coal (6) has been drifted into in a dozen or more places, and has been worked on a small scale for many years for local consumption, in Gadsden. These coals are over the Upper Conglomerate and perhaps correspond to (8), (9) and (10) of the Etna Section.

Some 100 yards down the creek from the lowest of the above drifts is a ledge some 20 feet in thickness of massive rocks. These rocks are believed to be of the *Upper Conglomerate.* No pebbles were seen in them, but there are some small pieces of conglomerates scattered over the surface just to the north of them. The strike of the ledge is almost E. & W., a little N. of E. and S. of W., and the dip is 60° to 70° to S. Some 75 yards still farther down the creek, at the edge

of the mountain (or Coal Measures,) along the line of fault between them and the flatwoods or Cambrian strata, on the south-west is a ledge of conglomerates with a strike of N. 80° E., and a dip of about 80° to N. N. W. This ledge is believed to be the *Lower Conglomerate*, though I can't say for certain as the strata are badly broken up here at the south-west edge of the coal field along the line of fault. It may be that both of the above ledges are of the Upper Conglomerate along the edges of a narrow or sharp deep wave or synclinal trough with a fault on each side of it in which are engulfed the Lower Conglomerate and other strata. The direction of this trough would be almost E. & W. and the fault on the north side of it would separate it from the *little basin*, and the one on the south side would be the great fault between it and the Cambrian strata. This latter supposition is strengthened in the fact that the Upper Conglomerate or the ledge highest up the creek has a dip towards the south. This dip appears to be the regular dip, and not due to any pushing or bending over of the strata towards the north. That it is the proper dip would seem to be the case from the occurrence of the true conglomerate or pebbly rock only on the north side of the ledge which, with the southward dip, would throw it just under or in the lower strata of the ledge just where the pebbly portions of the conglomerate most commonly occur.

Not over 100 yards to the west of Black Creek as it leaves the Coal Measures in a lagoon of the creek, and not over 5 to 6 feet above low water in the creek, and close to the line of the big fault between the Coal Measures and Cambrian strata is a *Sulphur Spring*. It is impossible to say whether this spring has its origin in the pyrites of the Coal Measures or in those of the Cambrian strata. Not over forty feet to the north of this spring, just across the road, runs the conglomerate ledge seen lowest down the creek. It here contains only a few pebbles and is badly broken up. The strike is almost E. & W., a little N. of E., and the dip is about 75° to N N W.

B. THE COAL MEASURES OF RACCOON AND BLOUNT MOUNTAINS.—The measures along their south-east edge or the south-east edge of the Raccoon Mountains from the county line on the north-east for some 15 miles to the south-west or to the north-east end of Greasy Cove, are badly broken up. In many places along this edge of the mountain, the stata are pushed or beet over to the N.W. until they are beyond the perpendicular or have a dip to the south-east. A fault occurs along this south east edge of the mountain in which are engulfed some of its strata.

At the Horton Gap in the S. E. corner of the N. E. ¼ of S. E. ¼ of S 8, T. 10, R. 6 E., there is the following Section.

HORTON GAP SECTION IN THE
N. E. ¼ OF S. E. ¼ OF S. 8, T. 10, R. 6 E.

(7) CONGLOMERATE (UPPER), massive.
(6) COAL, 6 to 8 in.
(5) *Debris;* about 25 ft.
(4) *Sandstones;* hard and massive, bluff, 15 ft.
(3) *Debris*; about 50 ft.
(2) CONGLOMERATE (LOWER); about 30 ft.
(1) *Debris.*

The strata of this out-crop are bent over to the N. W. until the dip is 75° to 80° to the south-east. The debris (1) covers at least one seam of coal.

In the N. W. ¼ of S. E. ¼ of S. 35, T. 10, R. 5 E, the Lower Conglomerate crops out at the base of the mountain, in Fisher's Creek, and is bent over to the N. W. until the dip is about 50° to the S. E. Some of the strata of the sub-conglomerate Coal Measures are here engulfed in the fault. Along the road in N. E. ¼ of S. 17, T. 11, R. 5 E., the dip on top of the mountain is only 6° to 8° to N. W., and then as the mountain is descended it is first 25° to 30° to N.W., then, about half-way down the mountain about 45° to N. W., then about perpendicular, and then lastly, near the foot of the mountain, it is beyond the perpendicular or is to the south-east. As the T. & C. V, R. R. descends

the mountain in a big cut about in the N. W. ¼ of S. E. ¼ of S. 18, T. 11, R. 5 E., the strata have a dip of about 35° to N. W., and then suddenly become perpendicular, and then gradually a little more than perpendicular, or get a dip of 70° to 80° to S. E. The strata as they become perpendicular are all broken up and there is here probably a fault. The big fault however is farther down the mountain or along the foot of the mountain.

On Line Creek in S. 8, T. 11, R. 5 E. is an out-crop of a seam of coal that is reported to be of good quality and to be from 18 to 20 inches thick. There are reported coal out-crops on the mountain in S. 4, T. 11, R. 5 E., from a few to eighteen inches in thickness. There are also some exposures of coal in S's 25 & 26, T. 10, R. 5 E. All of these coals are over the Lower Conglomerate and the thicker of them correspond to the Sewanee Seam, (6) of the Etna Section.

The mountain in the western part of T. 10, R. 5 E., to the north-east or in the line of Bristow's Cove or Murphree's Valley is a beautiful plateau with but little undergrowth and a fine growth of grasses. The large growth consists of oak, pine and hickory. The pine is mostly short leaf pine.

The Lower Conglomerate in the western part of S. 29, T. 10, R. 5, E., at the head of Bristow's Cove, dips 20° to 25° to S. E. There is on the side of the road here two chalybeate springs, one of them rises in strata just under the conglomerate, and the other in strata just over the conglomerate. They both probably have their origin in or near thin seams of coal.

At a spring in the N. E. ¼ of S. 11, T. 10, R. 4 E., there is said to be an out-crop of coal that has been dug into to a thickness of 18 inchess without getting through it. In several wells in the western part of this same section, coal is said to have been struck. This coal as well as that at the spring is doubtless all of the same seam, the Sewanee Seam, (6) of the Etna Section, which is here probably something over 18 inches in thickness.

In T. 11, R. 4 E., there are reported two out-crops of coal

that have been worked. They also probably belong to the Sewanee Seam, (6) of the Etna Section.

Along the south-east crest of the mountain in the northern part of S. 5, T. 12, R. 4 E., the dip is about 30° to N W., while down on the S. E. side of the mountain, it is from 70° to 75° to the N. W. The slope here from the brink of the mountain to the north-west is steep and is almost equal to the dip. The mountain here is only about 2½ miles broad from rim to rim, and from the very elevated south-east rim shows most plainly its trough shape.

In the south-west corner of this county, or in the N. E. ¼ of T. 12, R. 3 E., the country is very broken and there are reported to be from four to six seams of coal exposed above the Upper Conglomerate. These coal seams are said to range in thickness from a few inches to four feet. The lowest of these seams or the first seam above the Upper Conglomerate, or (8) of the Etna Section, is reported to be from 18 to 24 inches in thickness and a seam above this one from 12 to 14 inches in thickness. These coal seams have been dug into in but a very few places and so but very little is known as to their true number, thickness and quality.

10. THE COAL MEASURES OF BLOUNT COUNTY.

The Coal Measures of Blount county cover about 460 square miles. They are of three distinct or separated areas, though they are all of the Warrior Field and beyond the limits of the county are all connected. They are, commencing with the most south-eastern, *Blount Mountain*, *Raccoon Mountain* and *Sand Mountain*. Those of Blount Mountain are separated from those of Raccoon Mountain by Murphree's Valley and those of Raccoon Mountain from those of Sand Mountain by Brown's or Blountsville Valley. See Section 2. These three areas, for the sake of convenience, will be considered separately and in the order here named.

A. THE BLOUNT MOUNTAIN COAL MEASURES.—Blount Mountain is nothing more than the spur or prong of Raccoon Mountain that extends down between Murphree's Valley on the north-west and the Coosa Valley on the south-east. Its general trend is N. E. and S. W. Its length, from opposite the north-east end of Bristow's Cove, or Head of Murphree's Valley, to its south-west end, is about 38 miles, and its width varies from about 2 miles at the south-west end and 2½ miles at the north-east end to about 7 miles at its widest portion, near the center. The north-east end and the extreme south-west end however are respectively in Etowah and Jefferson counties, and the south-east edge is in St. Clair county, as the line between the Blount and St. Clair counties is the divide, between the waters of the Warrior and the Coosa rivers, on the south-east brink of the mountain. Blount Mountain is therefore principally in Blount county and its Coal Measures cover some 95 square miles in this county. These measures form the top of the mountain and occupy an irregular synclinal trough whose broad south-east side takes in much the greater part of the width of the mountain. The

most elevated portion of the mountain is therefore its south-east crest and the dip over most of the width of the mountain is to the north-west. This north-west dip along the south-east crest of the mountain is about 35° but it flattens towards the north-west and finally becomes almost level for some two miles to near the north-west edge of the mountain where throughout the greater length of the mountain, it is suddenly changed into a south-east dip, and this dip rapidly gets steeper and steeper until it becomes perpendicular along the north-west edge of the mountain. These perpendicular strata are of the conglomerates and hard strata near the base of the measures, and in many places form a high perpendicular wall into which has been cut narrow gaps by the different water courses in their flow from the synclinal trough of the mountain out in the Murphree's Valley.

A short distance to the north-west of the above perpendicular strata, or between them and the valley is a *big fault*, along which there has been a vertical displacement of strata of some 8000 feet or more. This fault very gradually dies out towards the north-east and very gradually leaves the edge of the mountain towards the south-west, and so the synclinal trough is not so irregular at either end along the center of the mountain. There are also in places at least *smaller faults*, on each side of the vertical strata. Section 2 will serve to show the structure of this mountain.

The above section shows that there is a much greater thickness of strata just below and above the conglomerates on the south-east side of the mountain than on the north-west side: this is doubtless due to an engulfing of strata in the smaller faults on each side of the vertical conglomerates.

The conglomerates of the perpendicular wall along the north-west edge of the mountain in the line of the above section are not exactly perpendicular on the out-crops; the inner or *Upper Conglomerate* dipping about 80° to S. E. and the outer or *Lower Conglomerate* from 80° to 85° to N. W.

The *big fault*, or the fault to which the great irregularity of

the strata along the N. W. edge of the mountain is due, is as shown in the above section, a little farther to the north-west. It, at the point of the above section, is just to the north-west of the mountain or between the mountain and Murphree's Valley proper. At this point, there is to the south-east of the *big fault*, between it and the Coal Measures or Conglomerates, some Clinton and Sub-carboniferous strata. These strata are badly squeezed and broken up; especially the lower ones or those nearest the fault. These lower strata or the Clinton and Fossiliferous chest strata, are in places to the N. E. and S. W. of this point entirely wanting. On the opposite or N. W. side of the *big fault*, there is shown in the above section Cambrian strata that dip under Murphree's Valley or to the north-west some 40°. To the north-east and south-west of this place, however, there is to be seen the Knox Dolomite in contact with the *big fault* on the north-west side. As the *big fault* gradually dies out near the north-east end of the mountain, and gradually leaves the mountain to the south-west, and as the *smaller faults* are due to the *big one*, the *smaller faults* do not probably occur in the Coal Measures near either end of the mountain. The strata rise from near the center of the mountain towards both ends, so they are thinner at the ends than near the center.

The Coal Measures of this Mountain have been treated of by Gen. A. M. Gibson in his report on the Raccoon Mountain Coal Field, published under the auspices of the State Geological Survey in 1886. In that report it is stated that the thickest of these Coal Measures, or those that lie about flat in the above section, exceed 2500 feet in thickness and include 12 coal seams that range in thickness from a few inches to 4 feet 10 inches. Gen. Gibson commenced at the top coal seam and numbered them downward. As given by him, the upper 8 seams are over or above the *Upper Conglomerate* and the lower 3 seams are under the *Lower Conglomerate* or *Millstone Grit*, and the remaining seam, 9, is between the conglomerates, just under the *Upper Conglom-*

erate. The lowest seam, 12, is placed near the bottom of the sub-conglomerate measures.

These coal seams with the exceptions of 1 and 2, and perhaps 3, would not show, in the above section, any north-west out-crops, as they have been engulfed in the *smaller faults* on each side of the perpendicular strata. The out-croppings on the south-east side of the mountain, under the Lower Conglomerate or Millstone Grit, are of course outside of this county, as the county line is along the south-east crest of the mountain. The upper five seams occur only in the flattened measures or along and to the north-west of the Little Warrior River. They therefore do not occur near either end of the mountain, but only on the north-western side along the center of the mountain.

DETAILS.

Gen. Gibson states in his report that all 12 of the coal seams crop out in T. 13, R. 2 E., through which the above section extends, and that all but the upper two of the coal seams are exposed in T. 13, R. 3 E. He also says that there show in T. 13, R. 2 E., along the river in S's 14 and 22 the seams 4 and 5, and in S's 28 and 33 the seam 6; on Difficulty and Coal branches the seams 7, 8 and 9; on Sand Creek, in S. 27, the seams 6 and 7, and on Dearmon Creek, in S. 23, the seam 7. He also reported that there are to be seen the seam 9 in S's 2, 3, and 10, T. 14, R. 2 E., and the seam 8, on Hurricane Creek, in the eastern part of T. 12, R. 3 E., and the seams 1 and 2 in S's 19 and 24, T. 12, R. 2 E.

He states that the seams 1 and 2 are probably the best of these seams; that seam 1 is a lustrous coal and is 3 feet thick, and that seam 2 is 4 feet thick. He also says that the seam 3 is a good coal; though it is generally thin, but in places it measures nearly 4 feet in thickness; that seam 4 is reported to be of good quality and to be 4 feet thick; that seam 8 is a good coal, and on the out-crop is from 18 to 24 inches thick, and would probably thicken on being dug into; that seam 9 is good solid coal, 3 feet 8 inches thick, and that seam 10 is reported to be of

good quality and to be 4 feet thick. The other seams 5, 6, 7, and 11, he says, are most likely thin. One of these thin seams, from 12 to 14 inches thick, he reports as out-cropping in S's 19 and 20, T. 12, R. 3 E. Several exposures of coal are reported by him to be in the south-east corner of T. 13, R. 1 E., and one of these in the S. E. ¼ of S. 33, T. 12, R. 3 E., he says is 4 feet 10 inches thick. He also says that this same seam shows in S. 5, T. 14, R. 1 E., where, on the out-crop, it is 3 feet thick; and that there are many exposures of coal in this same township.

Siderite or *Spathic Iron Ore*, of seemingly good quality, is said by Gen. Gibson to occur in many places on this mountain. In the N. ½ of S. E. ¼ of S. 27, T. 13, R. 2 E., its out-crop is reported by him to show for 100 yards, and to be fully 10 feet thick; it also makes its appearance, so he says, in S's 28 and 33, T. 13, R. 2 E., and in S's 4, 16 and 20, T. 12, R. 3 E., and in the S. E. ¼ of S. 24, T. 12, R. 2 E. This last out-cropping, he thinks to be at least 10 feet thick. He says that it occurs in large quantity in the thick bed of shales that underlie the coal seam 8.

Gen. Gibson, in 1888, made the following addition to his report of 1886:

"The following *detailed Section* given in descending order will show approximately the *Strata* and *Coal Seams* in the BLOUNT MOUNTAIN *Coal Measures* at its thickest part, omitting all seams under one foot in thickness:

"Ferruginous shale-sandrock, clay, etc., to top of mountain, 40 to 60 ft.

(17) COAL.—The big seam—Payne's Bed, Smith's Bed, etc., 4 to 5 ft.
Gray crumbling sandrock; arenaceous shales, and clay iron stone and a CONGLOMERATE that disintegrates easily. The FOURTH CONGLOMERATE, 75 to 80 ft.

(16) COAL.—The *Woodward Bed*, in two benches, with clay parting.—Coal varying from 1 ft. 3 in. to 2 ft.
Hard, gnarly sand rock and arenaceous shales, 60 to 80 ft.

(15) COAL.—*Armstrong Bed*, *Carnes Bed*, etc., 3 to 4 ft.
Shales, slates, and soft sand rock, 60 to 70 ft.

(14) COAL.—In bed of Amstrong's Creek, and other places, 1 ft. to 1 ft. 6 in.
Dark slate with some fossils, 75 to 80 ft.

(13) COAL.—Thin seam, varying from 1 ft. to 1 ft. 6 in.

THIRD CONGLOMERATE, pebbles mainly in the lower part, parts of it very ferruginous, generally a coarse grained sand rock, 100 to 120 ft.

(12) COAL, in two benches.—*Washington Bed*, 2 ft. to 2 ft. 4 in.

Soft shales and thin bedded sand rock, 20 to 25 ft.

(11) COAL, in river, cut in several deep holes, thickness unknown, supposed to be 3 ft. to 5 ft.

Shale and soft sand rock, and spathic iron ore, 70 to 80 ft.

(10) COAL, near mouth of Sand Creek, 3 ft.

Sand rock and shale, 50 to 60 ft.

(9) COAL, in bluff and bed of river, above mouth of Dearmon's Creek, and in Sand Creek, 1 ft. 6 in. to 2 ft.

Slates, shales, and sand rock, 60 to 70 ft.

(8) COAL, good, clean, bright. *Lowe's Bed*, 2 ft. to 2 ft. 6 in.

Sand rock, generally hard and massive, 75 to 100 ft.

(7) COAL, good, hard, cubical. On *Coal Bed Branch*, *Dearmon's Creek*, and *Difficulty Creek*, 1 ft. 9 in. to 2 ft.

Sand rock and hard shales, 15 to 20 ft.

SECOND CONGLOMERATE, soft and crumbly, some of it easily disintegrated with hard irony members, generally pebbly, 80 to 100 ft.

Blue curly shales and slates, irony shales, and arenaceous prismatic shales, 75 ft.

(6) COAL.—*Caskie Seam*, blue underclay 1 ft thick. Coal with some clay partings, 3 ft. 8 in.

Shales and Sandstones, 60 ft.

Massive sand rock, 10 ft.

Hardblue slate, 4 ft.

(5) COAL.—*Howard Seam*, with two feet of bluish white very fine underclay. Coal with ½ in. slate parting, 3 ft. 6 in.

Dark gray, micaceous sand rock, much of it soft and pulverulent, making sandy soil, with clays and shales, 250 ft.

FIRST or LOWER CONGLOMERATE—hard, irony in places: some parts very pebbly, others coarse grained sand rock, 80 to 100 ft.

Shales and flaggy sand rock, 10 ft.

(4) COAL.—varying in thickness, 8 in. to 1 ft.

Ripple marked sandstone, hard shales and sand rock, with beds of clay, 150 ft.

Bluish slate (containing two beds of *yellow calcareous* rock, some of it *fossiliferous* and *crystallized*—may be local): upper part highly arenaceous, 250 ft.

(3) COAL, of fair quality, not opened; estimated thickness, 1 ft. to 2 ft.

Slate and shale, with bands of yellow and reddish clays; bands of sand rock, etc., 90 ft. to 115 ft.

(2) COAL, thin seam at base of mountain, not opened and thickness not known.

Strata covered with debris, 75 to 80 ft.

(1) COAL, thin seam found in bed of Canoe Creek, near the Hooper Gap Road, thickness unknown.

Bluish, slaty sand rock, 10 to 15 ft.

Calcareous shale—very fossiliferous—upperpart an arenaceous shale, passing into the overlying slate, 15 to 20 ft.

Carboniferous Limestone underlying base of the Coal Measures.

DETAILS.

"Since the first brief report was written, in 1886, considerable work has been done in various parts of this coal field. Portions of it have been carefully examined by owners and other interested parties. Several additional seams of coal have by this means been discovered, and some of the known seams more fully exposed. The Alabama State Land Company, which owns a large portion of this field, has had a good deal of testing done in many places. The results of their work have not been made public, and are not generally available, yet, in a few places, where their test holes and pits have been dug and left open, additional knowledge of certain coal seams has been obtained. The most important of the exposures made by this Company is in an opening on a coal seam in S. 9, T. 14, R. 2 E., between *Buck's Ridge*, and the eastern top of the mountain, the head of the middle fork of Difficulty Creek. This coal seam was opened by Mr. Howard, and is hence called the *Howard Seam*. A cut was made into the hill at right angles to the dip of the bed, hence on a level and self draining. After good coal was reached, some 20 tons of coal were taken out, and part of it, at least, hauled to Birmingham and tested. All that was taken out was taken away. Fair samples of the coal could not be seen at the mouth of the drift. And the water dammed up by debris at the mouth of the drift, prevented entrance. Information obtained from those who assisted in doing the work at this place has therefore to be relied on for details. The correctness of these statements is fully borne out

by the appearance of the bed at the mouth of the drift. It presents the following Section:

SECTION OF HOWARD SEAM, S. 9, T. 4, R. 2 E.

Cap Rock; hard massive Sand rock, at face, 12 ft.
Yellowish gray Shale and blue Slate, 10 ft.
COAL, 1 ft.
Slate, 0 to ½ in.
COAL, 2 ft. 6 in.
Fire Clay, bluish white, very fine, 2 ft.

"Total thickness of coal, 42 inches. It is of good quality: clean, bright, lustrous, and nearly free from sulphur. It is said to coke well. The structure is complicated, from face and butt structure to cubical structure. This is a very excellent seam of coal, and it is not known to have been seen at any other point. This opening is, by aneroid measurement, 350 feet above the Blackburn fork, about 100 feet below the top of *Buck's Ridge*, and 150 feet below the eastern top of the mountain. It is the first seam yet found, above the FIRST or LOWER CONGLOMERATE, and may be identical with a seam observed, at the out-crop, on Hurricane Creek near the east side of T. 12, R. 3 E. Some have supposed it to be identical with the *Caskie Seam*, that was opened in S. 3, T. 14, R. 2 E.

"The *Caskie Seam* presents the following Section:

SECOND CONGLOMERATE, Buck's Ridge; 80 to 100 ft.
Soft Shale, on Slope to S. E., no rock seen, 60 ft.
Hard prismatic Shale, 10 ft.
Blue curly Shale, and irregular Clay Slate, 2 to 4 ft.
COAL—with several thin clay partings 3 ft. 8 in.
Fire Clay dark, Sandy 1 to 2 ft.

"The coal is more cubical and less lustrous than that of *the Howard Seam*; the partings are different, and it is nearer to Buck's Ridge and at a higher elevation than the Howard Seam. No cap rock has been seen above the *Caskie Seam*, while a heavy dark gray massive sand rock, with a naked face of 10 to 12 feet, caps the *Howard Seam*. There therefore, appears to be no point of identity between these seams,

except the similarity in thickness. The Caskie Seam is two inches thicker than the Howard seam. This is but a slight difference, and by itself would be immaterial, but, in connection with all the other evidence, it is adverse to their identity.

"It may be further remarked that the Caskie Seam, from its dip must of necessity crop out on the face of Buck's Ridge, where it was opened, and cannot be found farther to the south east; and that going in that direction below the level of this seam, there comes to the surface a rock seemingly identical in color and structure with the cap rock of the Howard Seam, and at the eastern top of the mountain, about the horizon of the base of this rock, were formed fossil coal plants and other evidence of the existence of a coal seam. From all this evidence it is regarded, at least as highly probable, that the Howard and Caskie openings are on *different seams* of *coal*, and that hence two very important seams exist between the *First* and *Second Conglomerates* in the Coal Field. This is a point of much geological interest and importance, as it shows a structure very different from anything yet discovered, or known, in the WARRIOR BASIN. In that part of the field, as yet, only, one small seam of coal, about one foot thick, is reported to exist between the First and Second Conglomerates, and the whole thickness of strata between them is stated to be about or less than 100 feet, while in this field the strata intervening between these two conglomerates are, by estimation, at least 325 feet thick, and contain, as now indicated, two thick seams, aggregating over 7 feet of coal. This subject will be referred to again in the discussion and description of the *Berry Mountain Coal Measures.*

"Another important addition to our knowledge of this Coal Field has been made in recent years by the discovery and opening of a thick seam in the high lands to the S.W. of the Locust fork of the Warrior River. In T. 12, R. 3 E., at several places, this seam has been opened. In the N. W. ¼ of S. 19, an opening was made since the region was visited, and it is stated that at that place the seam is 6 feet thick,

and that the coal is of excellent quality. Openings were examined in S's 2 and 10, of said T. At the opening in S. 2, the out-crop of the bed had been stripped, and the coal taken up. It showed 3½ feet of solid and apparently excellent coal. This is known as the *Payne bed.* An opening on the same seam was also seen in S. 10, of the same T. It is known as the *Smith bed.* At this opening the coal seam measured 4 feet and appeared to be excellent coal. The coal from all these openings have gained a high reputation as a shop coal. It is said to be very free from sulphur and to coke well and easily. This seam is capped by a few feet of slate and of hard shale, and a ledge of coarse grained, purplish gray sand rock. Its position is 150 feet, by aneroid measurement, above the *Carnes bed.* Between them there is a *conglomerate rock*, thickness unknown, carrying generally large pebbles. The rock is evidently soft and easily abraded; it was not seen, but the belt of pebbles scattered over the surface from the disintegrated rock, at a certain elevation, sufficiently marked its position. This seam of coal is probably the best yet opened in the field. It is also the highest known seam, and is formed only on the highest points of the mountain, on the side next to Murphree's Valley. Whether it exists north or north-east of the Locust fork has not yet been ascertained. It is very probable, however, that it does. It does not exist south of the divide between the Locust and Blackburn forks of the Warrior.

"In the N. W. ¼ of S. 1, T. 11, R. 4 E., on the lands of Green B. Waide, a good seam of coal has recently been opened. The opening is on the face of the eastern rim of the valley, 90 feet above the bed of Bristow's Creek, which flows here near the base of the mountain. The opening, though recently made, was caved in, so that the structure of the coal could not be seen. The rocks showed the bed to have a dip of 60° to the east. The cap rock, so far as could be seen, is a hard ferruginous massive sand rock. Between the cap rock and the coal is about four feet of fine laminated

blue clay, which is probably decomposed blue slate, that will be hard, and solid farther in.

"Mr. Waide gives the following descriptive section of this bed:

COAL, 46 in.
Clay, 4 in.
COAL, 4 in.
Total thickness of bed, 54 in.

"Clean coal, 50 inches.—The coal so far as seen is of good quality. It is said to be nearly free from sulphur, and to coke well, and work well in the blacksmith forge. It has not been otherwise tested.

"About 60 feet above the *Waide Coal bed*, there were seen an out-cropping of black smut and a bold spring of chalybeate water, both indicating the existence of another bed at that level.

"Large masses of conglomerate rock are scattered along the face of the mountain, from its base to the height of 60 feet or more above the *Waide bed*. The position of this conglomerate in the face of the mountain could not be found. Some of it evidently belongs above the coal seam; possibly all of it. But whether it is the second or third conglomerate, could not be determined, and consequently the identity of this bed with any other could not be decided on. It most probably is identical with either the *Carnes Seam*, or the *Baine Seam*, first opened in S. 8, T. 12, R. 3 E., to be hereafter described. It is evident, from the structure of the face of the mountain, that this fine seam of coal of the Waide Seam may be opened at almost any point for 8 or 10 miles along the eastern line of the valley; or from near the head of the valley to near the Locust fork of the Warrior. At, and near the river, it probably is below the water level, as the strata seem to sink in that direction to the river, and rise again to the S. W. of the Warrior.

"South-west of the Waide opening, the dip of the strata to the east, and south-east gradually diminishes, and will not be found a serious obstacle in mining.

"Should the out-cropping of smut, seen 60 feet above the Waide Seam, prove to be another workable seam of coal, this will prove a most valuable portion of the coal field. Its proximity to and easy access from the valley would add much to its importance for mining and for marketing the coal.

"The seams which crop out in, or are cut and exposed by the Blackburn fork of the Little Warrior, are the most difficult of identification. In the meanderings of that stream, coal is exposed at many places. Often in deep water, where the thickness of the bed, or the special characteristics of the coal, cannot be seen. These exposures extend for many miles in a south-west direction, that is along the strike or parallel with the strike of the coal seams. The rocky strata, and other guides, cannot be traced from point to point; nor can the relation of level to the dip of the strata be made out in the meanderings of the stream. Hence it has, so far, been impossible to determine how many coal seams are cut by this river, or to decide with certainty on the thickness of the several beds or the character of the coals. And such is the dip of the strata and the denudation on the south-east side of that stream, that, with a single exception, *no coal seam cut by it*, is found on its south-east side. That exception is a little above the mouth of Dearmon's Creek, where a bed of coal, cut by the river, was found cropping out in the bluff, 100 yards south-east of the stream.

"Several of the coal seams cut by the river are reported and believed to be thick beds. They could readily be tested by boring, but, being below water level, cannot be exposed by digging. Some of them are probably exposed in the uplift at the edge of Murphree's Valley.

"No systematic mining has yet been done in this field, and the market values or industrial adaptations of its coals have not been tested; yet, it is believed that, when practically tested, they will compare favorably with those from any other portion of the state.

"The most productive portion of this field will be found to be a belt about five miles wide, extending from the divide

between the head waters of Canoe Creek, and the Blackburn Warrior to a point opposite the head of Bristow's Cove, and adjoining Murphree's Valley on the south-east. This belt is nearly forty miles long, and contains nearly 200 square miles of very productive Coal Measures. The facility with which most of the seams may be mined, and their proximity to the valley, and thence to market, add very greatly to their prospective value.

The L. & N. R. R. in its geological researches along the located line of the Huntsville Branch of the Birmingham Mineral Railroad has done a great deal of work in testing the coal seams of Blount Mountain and of the south-west end of Raccoon Mountain. It has kindly placed in the hands of the State Geological Survey the field notes of that work, from which the following *bed sections* of test pits etc., on Blount Mountain have been taken.

BED SECTIONS OF TEST PITS ON BLOUNT MOUNTAIN, ETC., FROM THE FIELD NOTES OF THE B. M. R. R.

(1) *In a Ravine on a small Branch, some ¾ Mile South-west of Wade's Gap, or in the N. E. ¼ of N. E. ¼ of S. 33, T. 13, R. 1 E.*

Roof; slate.
COAL, 27 in.
Slate, 4 in.
COAL, 14 in.
Sandstone.

This coal gives a red ash.

(2) *About ½ Mile East of Viola on the North Bank of "Dry Branch" in the N W. ¼ of S. W. ¼ of S.* 33, *T.* 13, *R. 1 E.*

Roof; slate.
COAL. 30 in.
Shale, 7 in.
COAL, 15 in.
Sandstone.

(3) *About 1 Mile from Viola, in Warrior River Gap, on the North Bank of the River, in the N. W. ¼ of N. W. ¼ of S. 4, T. 14, R. 1 E.*

Roof; slate.
COAL, 30 in.
Shale, 3 in.
COAL, 12 in.
Sandstone.

This coal gives a red ash.

(4) *In Wade's Gap in the N. E. ¼ of S. E. ¼ of S. 27, T. 13, R. 1 E.*

Roof; slate.
COAL, 26 in.
Shale, 2 in.
COAL, 16 in.
Sandstone.

(5) *In Clowdes' Gap on the North Side of Public Road, in the N. E. ¼ of S. E. ¼ of S. 13, T. 13, R. 1 E.*

Roof.
COAL, with shale partings, 2 ft. 8 in.
Measures, about 150 ft. 0 in.
COAL, 10 in.
Measures, about 80 ft. 0 in.
COAL, 1 ft. 0 in.
Measures, about 60 ft. 0 in.
COAL, about 2 ft. 6 in.

These coal seams and measures are on their edges. The uppermost seam has the following detailed section:

Roof.
COAL, 5 in.
Shale, 2 in.
COAL, 5 in.
Shale, 12 in.
COAL, 8 in.

(6) *On the East Bank of Difficulty Creek in the S. E. ¼ of N. E. ¼ of S. 9, T. 14, R. 2 E.*

Roof; slate.
COAL, 9 in.
Shale, 2 in.
COAL, 21 in.
Fire Clay, 24 in.

This section is 70 feet within, at the end of an old drift.

(7) *On the West Side of Difficulty Creek, at the head of a Ravine, in the S. W. ¼ of N. W. ¼ of S. 14, T. 4, R. 2 E.*

Roof; sandstone.
COAL, 21 in.
Fire Clay.

(8) *On the North Side of Hullett's Gap, 50 feet from Rock Branch, in the S. E. ¼ of N. E. ¼ of S. 7, T. 14, R. 1 E.*

Roof; blue shale.
COAL, bright, 9 in.
Sandstone.

(9) *On Side of Hill 50 feet above Saw-Mill Branch in the N. E. ¼ of S. E. ¼ of S. 7, T. 14, R. 1 E.*

Roof; slate.
COAL, 9 in.
Fire Clay.

This coal is on its edge.

(10) *About 300 yards South-west of Mr. A. M. Jones' Residence, at the head of a Ravine, in the N. E. ¼ of N. E. ¼ of S. 17, T. 14, R. 2 E.*

Roof; shale.
COAL, 9 in.
Shale, 1 in.
COAL, 11 in.
Fire Clay, floor.

(11) *About 200 yards South-west of Pit (10), in the S. E. ¼ of S. W. ¼ of S. 17, T. 14, R. 2 E.*

Roof; drift, about 7 ft. 0 in.
COAL SMUT, 7½ in.

(*12*) *About 150 yards West of Pit* (*11*), *in the N. W. ¼ of N. E. ¼ of S 17, T. 14, R. 2 E.*

Roof; drift, about 8 ft 0 in.
COAL SMUT, 8 in.

(*13*) *About 150 yards West of Pit* (*12*), *in the N. W. ¼ of N. E. ¼ of S. 17, T. 14, R. 2 E.*

Roof; drift, about 10 ft. 0 in.
COAL SMUT, 3 in.

(*14*) *About 200 yards West of Pit* (*13*), *in the N. E. ¼ of N. W. ¼ of S.* 17, *T. 14, R. 2 E.*

Roof; drift, about 12 ft. 0 in.
COAL SMUT, 4 in.

(*15*) *About 200 yards South of New Hope Church, on Spring Branch in the N. E. ¼ of S. W. ¼ of S. 12, T. 14, R. 2 E.*

Roof; drift, about 7 ft. 0 in.
COAL SMUT, 1 ft. 0 in.

(*16*) *About 100 feet above Mill Branch* (*Creek*) *on the North Side in the S. E. ¼ of S. E. ¼ of S. 11, T. 14, R. 1 E.*

Roof; shale.
COAL, 8 in.
Shale, 1 in.
COAL, 12 in.
Fire Clay; floor.

(*17*) *About 200 feet from Walker's Mill Branch on the North Side in the N. W. ¼ of S. E. ¼ of S. 11, T. 14, R. 1 E.*

Roof; drift, about 5 ft. 0 in.
COAL SMUT, 1 ft. 3 in.

(*18*) *In head of Ravine about 300 feet from School House and 200 feet North of Walker's Mill Branch, in the N. W. ¼ of N. E. ¼ of S. 11, T. 14, R. 1 E.*

Roof; shale.
COAL, 8 in.
Shale, 1 in.
COAL, 11 in.
Fire Clay, floor.

(19) *About 300 yards South-west of Pit (18), on the West side of the South Prong of Walker's Mill Creek, in the N. E. ¼ of S. W. ¼ of S. 11, T. 14, R. 1 E.*

Roof; drift, about 4 ft.
COAL SMUT, 1 ft.

(20) *On the West Side of Walker's Mill Branch, at the Head of a Ravine, in the N. E. ¼ of N. E. ¼ of S. 15, T. 14, R. 1 E.*

Roof; shale.
COAL, 10 in.
Shale, 1 in.
COAL, 10 in.
Fire Clay, floor.

(21) *About 600 yards West of Pit 20, in the N. W. ¼ of the N. W. ¼ of N. E. ¼ of S 15, T. 14, R. 1 E.*

Roof; shale.
COAL, 10 in.
Shale, 1 in.
COAL, 10 in.
Fire Clay.

(22) *On the East Side of the Branch, about 300 yards above the Saw-Mill, or in the N. W. ¼ of S. W ¼ of S 5, T. 14, R. 1 E.*

Roof.
COAL, 4 in
Measures, about 60 ft. 0 in.
COAL SMUT, 6 in.

These seams and measures are on their edges.

(23) *On the North Side of Hullett's Gap, about 300 feet up the Mountain from the Branch and 100 feet below Pit (8), in the N. E. ¼ of S. E. ¼ of S. 7, T. 14, R. 1 E.*

COAL, on edge 12 in.

Some 60 feet over pit (8) is a seam of coal 4 inches thick.

(24) *On the North Side of Straight Mountain on Terrapin Creek in Hay's Gap in the S. E. ¼ of N. W. ¼ of S. 8, T. 12, R. 3 E.*

Roof; sandstone.
Slate; blue. 48 in.
COAL, 35 in,
Slate, 4 in.
COAL, 7 in.
Slate; blue, floor.

This coal is hard and glossy. The dip 20° 30° to South.

(25) *About 200 feet North of Pit (24), in the S. E. ¼ of N. W. ¼ of S. 8 T. 12, R. 3 E.*

Roof; blue slate.
COAL, 38 in.
Slate, 2 in.
COAL, 5 in.
Slate; floor.

(26) *About 400 feet South of Terrapin Creek, in a Ravine in the N. W. ¼ of N. W. ¼ of S. 8, T. 12, R. 3 E.*

Roof; slate
COAL, 24 in.
Slate, ¼ in.
COAL, 3 in.
COAL, *Slate;* 2 in.
Slate, 5 in.
COAL, *Slate;* 3 in.
Slate; blue, floor.

The seam here has been disturbed.

(27) *About ¼ Mile South of E. C. Bynum's House, at the Head of a Small Ravine in the S. E. ¼ of S. E. ¼ of S. 7 T. 12,* R, *3 E.*

Roof; slate, blue.
COAL, 46 in.
Slate; blue.

This coal is hard, bright and curly. Dip, about 15° to N.

(28) *About 250 yards South-east of E. C. Bynum's House on the Mountain Side in the N. E. ¼ of N. E. ¼ of S. 18, T. 12, R. 3 E.*

Roof; blue strata.
COAL, 38 in.
Slate; blue floor.

This coal is hard, bright and curly.

(29) *On the North Side of Straight Mountain, in a Small Ravine in the N. W. ¼ of N. E. ¼ of S. 17, T. 12, R. 3 E.*

Roof; sandstone.
COAL, 31 in.
COAL, *Slate;* 6 in.
COAL, 4½ in.
Slate; blue, floor.

This coal is hard and bright.

(30) *About 800 feet East of Mr. J. McClelland's House, at the Head of a Ravine near the Summit of the Mountain, or in the S. E. ¼ of S. 8, T. 12, R. 3 E.*

Roof; sandstone.
COAL, 4 in.
COAL. *Slate,* 3 in.
COAL, 4 in.
Slate; floor.

This seam is above the conglomerate.

(31) *About ¼ Mile East of J. McClelland's House, on the South-east Side of Straight Mountain, in the Gap in the S. W. ¼ of S. 9, T. 12, R. 3 E.*

Roof; sandstone,
COAL, 19 in.
COAL, *Slate,* 12 in.
Slate; blue floor.

(32) *About ¼ Mile East of Hopper's House and 200 feet from Gum Spring, in the N. E. ¼ of S. W. ¼ of S. 4, T. 12, R. 3 E.*

Roof; slate.
COAL, 12 in.
Slate; floor.

This is the lowest seam cut in Straight Mountain.

(33) *At the Head of a Small Ravine in the S. W. ¼ of N. E. ¼ of S. 5, T. 12, R. 3 E.*

Roof; slate.
COAL, 16½ in.
Slate, ½ in.
COAL, 3 in.
Slate; floor.

This pit is 30 feet below the top of the mountain.

(34) *On the Summit of the Ridge 200 feet South of Pit (33), or in the S. W. ¼ of N. E. ¼ of S. 4, T. 12, R. 3 E.*

Roof; shale.
COAL, 26½ in.
Slate, 1 in.
COAL, 3 in.
Slate, 1½ in.
COAL, 2 in.
Slate; floor.

This coal is soft and badly weathered.

(35) *In the Head of Ravine, 500 feet South of Pit (34), in the S. E. ¼ of N. E. ¼ of S. 4. T. 12, R. 3 E.*

Roof; shale.
Shale, bituminous, 10 in.
COAL, 26½ in.
Clay, 1 in.
COAL, 3½ in.
Clay, ½ in.
COAL, 5 in.
Slate; floor.

This coal is hard and bright.

(36) *On the Side of St raight Mountain ½ miles West of W. A. Coles' House, or in the N. W. ¼ of S. 3, T. 12, R. 3 E.*

Roof; sandstone.
COAL, 16 in.
Fire Clay; floor.

This coal is soft and weathered on the out-crop.

(37) *On the Side of Straight Mountain 25 feet below Pit (36), in the N. W. ¼ of S. 3, T. 12, R. 3 E.*

Roof; shale.
COAL, *Clay;* 1 in.
COAL, 2 in.
COAL, *Clay;* 1 in.
Clay; shaly, floor.

(38) *The "Payne Opening," in Ravine near the top of Mountain, in the S. E. ¼ of S. E. ¼ of S. 34, T. 11, R. 3 E.*

Roof; blue slate.
COAL, 16 in.
MINERAL CHARCOAL, 3 in.
COAL, 7 in.
Slate; hard, floor.

This coal is hard and curly.

(39) *About 50 feet below Pit (38), in Gully in the S. E. ¼ of S. E. ¼ of S. 34, T. 11, R. 3 E.*

Roof: slate.
COAL, 5 in.
Slate; floor.

This coal is hard and bright, and has a *face and butt structure.*

(40) *On Hill Side 75 feet East of Gadsden Road in S. 34, T. 11 R. 3 E.*

Roof; slate.
COAL, 5 in.
Slate; blue, floor.

(41) *The "Smith Opening" in the S. E. ¼ of S. E. ¼ of S. 35, T. 11, R. 3 E.*

Roof; slate, blue.
COAL, 35 in.
Slate; blue, floor.

This coal is hard, bright and curly.

(42) *On the Side of Raccoon Mountain about 50 feet below Pit (41), in the S. E. ¼ of S. E. ¼ of S. 35, T. 11, R. 3 E.*

Roof; arenaceous shale.
COAL, 8 in.
Slate; blue, floor.

(43) *In Bed of Branch 150 feet North-east of Pit (28), in the N. E. ¼ of N. E. ¼ of S. 18, T. 12, R. 3 E.*

Roof; drift.
COAL, 32 in.
Mineral Charcoal, ½ in.
COAL, 4 in.
Slate; blue, floor.

This pit is 20 feet under pit (28); on being driven into 20 feet, the roof becomes a hard slate. The coal is hard and curly, and the mineral charcoal does not extend across the pit.

(44) *About 300 feet North-east of Smith's House on the Side of a Ravine in the N. W. ¼ of S. E. ¼ of S. 36, T. 11, R. 3 E.*

Roof; slate.
Clay, COAL; 4 in.
Slate, 34 in.
COAL, 3 in.
Slate, 5 in.
COAL, 9 in.
Slate; floor.

(45) *About ¼ Mile East of Smith's House in bed of Branch in the N. E. ¼ of S. E. ¼ of S. 36, T. 11, R. 3 E.*

Roof; slate.
COAL, 4 in.
Slate, 9 in.
COAL, 8 in.
Slate; floor.

(46) *About 20 feet East of Gadsden Road in the N. E. ¼ of S. E. ¼ of S. 36, T. 11, R. 3 E.*

Roof; shale.
COAL, 5 in.
Fire clay.

This coal is dirty and weathered.

(47) *About 10 feet above Pit (45), in the N. E. ¼ of S. E. ¼ of S. 36, T. 11, R. 3 E.*

Roof; slate.
COAL, 6 in.
Slate; floor.

(48) *Near Summit of the Mountain, about 120 feet above Pit (44), in the N. W. ¼ of S. E. ¼ of S. 36, R. 3 E.*

Roof; red clay.
COAL, 5 in.
Fire clay; floor.

(49) *At the Head of a small Ravine on the North-west Side of Straight Mountain in the S. E. ¼ of S. E. ¼ S. 16, T. 11, R. 4 E.*

Roof; slate.
COAL, 4 in.
Slate; floor.

B. THE RACCOON MOUNTAIN COAL MEASURES.—Raccoon Mountain, as has been stated, is separated from Sand Mountain by Brown's Valley, and so after this valley dies out on the south-west, just within Blount County, the two mountains become one, or are blended together into a mountainous country that gradually merges into the basin area of the Warrior Coal Field.

The portion of Raccoon Mountain that is within this county is its south-west end or that portion that lies between Murphree's and Brown's valleys. Its Coal Measures, as they form the top of the mountain, are, of course co-extensive with the mountain, and cover in this county some 235 square miles. They form a broad flat synclinal trough with the edges next to the valleys, but slightly elevated, and the central portion badly cut up or denuded by the Locust fork of the Warrior River and its tributaries. The general dip along the south-east edge is about 20° to N. W., while that along the north-west edge is only 10° to 12° to S. E. These dips, however, gradually diminish as the edges are left, or towards the interior of the mountain. In places, at least, the strata are in waves from N. W. to S. E. and

also from N. E. to S. W. Those from N. E. to S. W. appear to be much longer and flatter, or more gentle, than those from N. W. to S. E. These latter along the edges of the mountain are especially short and sharp. There is also a small general dip towards the south-west or towards the *basin area* of the Warrior Field, and so the thickest measures are along the county line on the south-west. These thickest measures are believed to be some 1800 feet in thickness and to include over 20 coal seams that range in thickness from a few inches to some seven feet. These seams include those of the Blount Mountain section, though they are not believed to be altogether as thick in this mountain as they are said to be in Blount Mountain. The uppermost five to six of these seams including the thickest one, the well known New Castle seam, come up into this county but a short distance, some four miles, or cover but a small area in the county 8 to 9 square miles, while the lowest three of these seams, or those under the *Upper Conglomerate*, if they occur in here, underlie about all of the Coal Measures in the county. One of these three seams or a higher seam crops out in Gurley's Creek in S. 29, T. 14, R. 1 W., where it is said to be 22 inches thick. Farther down Gurley's Creek, in the neighborhood of Smith's Mill, in the N. E. ¼ of N. E. ¼ of S. 23, T. 14, R. 2 E., are several reported out-crops of coal which are probably of the uppermost seams. One of these seams in an out-crop in the creek about one-half mile above the mill is said to be 4 feet 4 inches thick, and to have no slate partings. An out-crop in the road at the mill shows about 12 inches in thickness of coal smut with a fire-clay underbed. In S's 2 and 12, T. 14, R. 2 W. are out-crops of coal that are said to be respectively 3 feet 4 inches and 5 feet 7 inches in thickness. They are also doubtless of the uppermost seams.

Near the south-east edge of the mountain, in S. 16, T. 14, R. 1 W., there is an out-crop of coal that is reported to be 3 feet 4 inches thick. In the southern part of S. 8, T. 14, R. 1 W., are the reported out-crops of two seams of coal. The upper one is thought to be about 4 feet thick and the lower

one 3 feet thick. To the north and north-east of these last out-crops, for a long distance, the exposures of coal are said to be thin. In the river near the county line, there is said to be a seam of coal from 3 to 4 feet thick. This coal, during low stages of the water, was raised and loaded on flat-boats, which, in time of freshets, were floated down to Tuscaloosa and Mobile.

In the wells on the high-lands near the south-west corner of S. 27, T. 13, R. 2 W., a seam of coal about 2 feet thick is said to have been struck. A thin coal seam is said to crop out from under bluffs of shale in the N. E. ¼ of S. 29, T. 13, R. 2 W. There is also said to be an out-crop of coal in the river, in S. 25, T. 13, R. 2 W. For the true thickness etc., of the above coal seams see below the *bed sections*, taken from the field notes of the L & N. R. R. along the located line of the Huntsville branch of the Birmingham Mineral Railroad. These *bed sections* also cover the coal out-crops farther to the north-east, including those of Berry Mountain, between the Locust fork of the Black Warrior River, on which there is also given a report by Gen. A. M. Gibson.

The conglomerate bluff along the north-west edge of Raccoon Mountain, next to Brown's Valley, show in many places that they, as well as the accompanying strata, are in waves from north east to south west, and also from north west to south-east. As every where seen, those from north-east to south-west are long shallow waves, and those from north-west to south-east, along the crest of the mountain, are short sharp waves or crumples in the strata. These conglomerates, the Lower and Upper Conglomerates of Tennessee, often form naked glady places along this crest of the mountain. On the side of the mountain under the Lower Conglomerate, there have been seen a few out-crops of the *Cliff Seam*. One of these occur, at the south-west end of the Blountsville Valley, in a cut on the L. & N. R. R. near Reed's Gap. It is about one foot in thickness.

The *Chalybeate Springs* on the side of the mountain and the Blount Springs and Birmingham wagon road in the N.

E. ¼ of S. 19, T. 13, R. 2 W., probably have the ir origin in a thin sub-conglomerate coal seam.

Along the foot of the mountain or the south east edge of the Blountsville Valley, in the Mountain Limestones, in T. 12, R's 1 and 2 W., are some *big* sinks which drain large coves in the valley. The waters of these coves after disappearing in the big sinks and flowing under the high mountain rim, of principally the Lower and Upper Conglomerates, make their appearance to the south-east of this high rim and flow to the south-east, over Coal Measures, into the Locust fork of the Black Warrior River. During heavy freshets these sinks cannot carry off the water fast enough, so it backs up against the mountain and over the sinks, some times to a depth of 25 to 30 feet. The edge of the mountain along here is very ragged; it is indented with deep coves, and high promontories capped with the conglomerates, usually the lower conglomerate extend out from it into the valley between the coves.

The *Cliff Seam* shows at the *Cave Spring* in the south-east corner of S. 10, T. 11, R. 1 E., where it is about 10 inches thick. It is here a poor coal. The rocks over this exposure of coal are thick flagstones that form a bluff some 75 feet high, though just to the north-east and south-west of this point the same bluff is a massive conglomerate, Millstone Grit.

The *Cave Spring* is a semi-cone shaped hole or sink against the foot of this bluff. It is always partly filled with water that is usually within about 20 feet of the top of the cave, though, it is said, in times of freshets to get several feet higher. The water has a bluish color and looks to be of great depth. Water is always trickling over the bluff, which during the summer months is covered with a growth of beautiful and rare ferns. The sub-conglomerate measures are here thin and it is probable that the *Cave Spring* extends down into sub-carboniferous limestone. The dip is 10° to 15° to S. E.

On the side of the mountain, just under the Lower Conglomerate or Millstone Grit bluff, in the N. E. ¼ of N. E. ¼ of S. 19, T. 10, R. 2 E., there is considerable *brown ore*. It

is said to be in places ten feet thick. Most of it is sandy, or is made up of alternate streaks of very hard compact ore and very siliceous or sandy matter.

In Dry Creek, the head waters of Big Spring Creek, there is, in the S. E. ¼ of S. E. ¼ of S. 18, T. 10, R. 2 E., at the foot of the mountain, a showing of coal. This coal is doubtless part of a slide, as it is in the sub-carboniferous valley, and as there are sub-carboniferous strata in places near it and beween it and the mountain or the edge of the Coal Measures. The debris around it is of the Coal Measures, and has in it considerable good brown ore in nodules of peculiar shapes that are stringy and full of holes. This ore is believed to be the same as that seen on the side of the mountain under the Millstone Grit bluff, and it must have come down in the slide with the coal from the bluffs near the top of the mountain, now about one-half mile distant to the south-east. There are also along with this ore some irregular nodules or pebbles of chert, and just across the creek from it there is some little manganese ore. Near this ore is a well from which there is said to have been taken, 30 to 40 feet below the surface, some hickorynuts and charcoal. This could also be accounted for by the slide that brought the coal down. This well is just to the east or south-east of the sub-carboniferous or LaGrange Sandstone in ledges which probably stopped the slide.

In the road up the mountain in the N. E. ¼ of S. 34, T. 9, R. 2 E., near the county line, there is an out-crop of the coal seam (4) or (5) of the Etna Section. This out-crop is from 10 to 15 feet under the Millstone Grit, with flaggy sandstones between. Some 35 feet under this coal is a showing of the brown ore in a stratified seam. The ore of this out-cropping appears to be of very good quality.

BED SECTIONS OF TEST PITS ON COAL OUT-CROPPINGS, ETC., OF RACCOON MOUNTAIN; FROM FIELD NOTES OF THE B. M. R. R.

(1) *Near the Head of North Creek on the North-east Side in S. E .¼ of S. W. ¼ of of S. 26. T. 15, R. 2 W.*

Cap Rock; Shale.
COAL, 32 in.
Fire Clay.

This coal seam was not identified. The Coal has a red ash.

(2) *On the South-west Side of North Creek, 300 yards below (1), or in the S. W. ¼ of S. W. ¼ of S. 26, T. 15, R. 2 W.*

Cap Rock; shale, 60 in.
COAL, 50 in.
Fire Clay.

Can not identify this seam. Considered the finest seam cut on Raccoon Mountain. The dip is 55° to N. 50° W. The coal has a red ash.

(3) *On the North-west Side of North Creek, about 200 yards below (2), or in S. W. ¼ of S. W. ¼ of S. 26, T. 15, R. 2 W.*

Roof; shale, 48 in.
COAL, 13 in.
Shale, 4 in.
COAL, 5 in.
Shale, 6 in.
COAL, 12 in.

This seam is 75 feet under the *Black Creek Seam.* The dip is 19° to 30° W. The coal has a red ash.

(4) *On the South-west Side of North Creek, 500 yards below (3), or in the N. E. ¼ of S. E. ¼ of S. 26, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 24 in.
Fire Clay.

Supposed to be the *Black Creek Seam.* The coal has a red ash.

(5) *On North Bank of a Branch of North Creek, in the N. E. ¼ of S. E. ¼ of S 27, T. 15, R. 2 W.*

Roof; shale.
COAL, 30 in.
Clay.

This is supposed to be the *Jefferson Seam;* it is about 30 feet above (4).

(6) *On the South-west Side of Turkey Creek, in the N. W. ¼ of N. E. ¼ of N. E. ¼ of S. 25, T. 15, R. 2 W.*

Roof; shale.
COAL, 20 in.
Fire Clay.

This is the *Hanby Old Mill Seam.* It is believed to be the same seam as (1). The coal has a red ash.

(7) *On Turkey Creek, 100 yards from the South-west Bank, in the N. W. ¼ of N. E. ¼ of S. 25, T. 15, R. 2 W.*

Roof; shale, 115 in.
COAL, 21 in.
Fire Clay.

Believed to be the same seam as (2). The coal ash is red.

(8) *On the South-west Side of Turkey Creek, ¾ Mile below* (7), *or in the S. W. ¼ of N. E. ¼ of S. 24, T. 15, R. 2 W.*

Roof; shale.
COAL, 8 in.
Slate, 1 in.
COAL, 6 in,
Slate, 1 in.
COAL, 18 in.

This is considered to be the *Jefferson Seam.*

(9) *On the South-west Side of Turkey Creek, ¾ Mile below (7), or in the S. W. ¼ of N. E. ¼ of S. 24, T. 15, R. 2 W.*

Roof; shale.
COAL, 26 in.
Shale and *Fire Clay*.

This seam is 40 feet below (8) and is thought to be the *Black Creek Seam.*

(10) *On the North-west Bank of Turkey Creek, some 50 yards from the Creek, in the S. W. ¼ of S. 13, T, 15, R. 2. W.*

Roof; shale.
COAL, *Shale*; mixed, 12 in.
COAL, 25.
Fire Clay.

This is thought to be the *Jefferson Seam.*

(11) *On the North-west Side of Turkey Creek, ½ Mile North-east of (10), or in the N. E. ¼ of S. 13, T. 15, R. 2 W.*

Roof; shale.
COAL, 7½ in.
Shale, 2 in.
COAL, 6 in.
Shale, 1 in.
COAL, 7 in.
Fire Clay.

This is thought to be the *Jefferson Seam.*

(12) *On Turkey Creek, 100 yards North-east of (11), or in the N. E. ¼ of S. W. ¼ of S. 13, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 16 in.
COAL, *Clay;* mixed, 9 in.

This is thought to be the *Black Creek Seam.*

(13) *On the North-east Bank of North Creek, about One Mile above its Junction with Turkey Creek, or in the N. W. ¼ of S. W. ¼ of S. 22, T. 15, R. 2 W.*

Roof; slabby sandstone.
COAL, 11 in.
Shale; blue.

(14) *On the South Bank of North Creek, ½ Mile above its Junction with Turkey Creek, or in the N. E. ¼ of N. E. ¼ of S. 21, T. 15, R. 2 W.*

Roof; shale.
COAL, 5 in.
Shale.

(15) *Out-crops on Public Road near Ben Taylor's Mill, or in the S. E. ¼ of N. W. ¼ of S. 15, T. 15, R. 2 W.*

Roof; clay and shale.
COAL, 7 in.
Clay.

(16) *On the Divide between Self and Turkey Creeks, in the S. W. ¼ of N. W. ¼ of S. 11, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 22 in.
Shale, 1 in.
COAL, 11 in.
Clay, blue 34 in.
COAL, 31 in.

Thought to be the "*New Castle Seam.*"

(17) *On the Divide between Self and Turkey Creeks ¾ Mile East of (16), or in the S. E. ¼ of N. E. ¼ of S. 11, T. 15, R. 2 W.*

Roof; sandstone.
COAL, poor, 6 in.
Shale, 1 in.
COAL, 23 in.
Shale, 1 in.
COAL, 19 in.
Shale, 28 in.
COAL, 25 in.
Shale.

Thought to be the "*New Castle Seam.*"

(18) *On the South-west Bank of a Branch of Self's Creek, in the N. E. ¼ of N. W. ¼ of S. 18, T. 15, R. 1 W.*

Roof; shale.
COAL, 1 in.
Clay.

(19) *On Public Road, ½ Mile North of Self's Creek, in the S. W. ¼ of N. E. ¼ of S. 7, T. 15, R. 1 W.*

Roof; shale,
COAL, 1 in.
Clay.

(20) *South of Self's Creek ¼ Mile, or in the S. E. ¼ of S. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; shale.
COAL, 13 in.
Shale, 2 in.
COAL, 22 in.
Shale.

This is considered the *Jefferson Seam.*

(21) *About 300 yards South-east of Self's Creek, in the S. E. ¼ of S. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; slate.
COAL, 24 in.
Slate, Fire Clay.

This is thought to be the *Black Creek Seam;* it is about 25 feet below the *Jefferson Seam.*

(22) *South of Self's Creek about ¼ Mile, in the S. E. ¼ of S. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; slate.
COAL, 4 in.
Shale, 3 in.
COAL, 23 in.
Fire Clay.

Thought to be the *Jefferson Seam.*

(23) *Some 950 feet South-east of Self's Creek, in the S. E. ¼ of S. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 29 in.
Fire Clay.

This is the *Jefferson Seam;* it is about 25 feet above the *Black Creek Seam.*

(24) *Some 150 yards South of Self's Creek, in the N. ½ of S. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 16 in.
Shale, 1 in.
COAL, 18 in.
Fire Clay.

Thought to be the *Jefferson Seam.*

(25) *On a Small Branch, some 125 yards South-west of Self's Creek, in the S. W. ¼ of N. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; slate.
COAL, 38 in.
Fire Clay.

This coal is of a dull color, without luster; it is thought to be the *Black Creek Seam.*

(26) *On a Small Branch, some 180 yards South-west of Self's Creek, in the S. W. ¼ of N. W. ¼ of S. 12, T. 15 R. 2 W.*

Roof; shaly clay.
COAL, 10 in.
Shale, COAL, 36 in.
COAL, 4 in.
Fire Clay.

(27.) *On side of public road, about* 150 *yards north-east of Self's creek, in the S. W. ¼ of N. W. ¼ of S. 12, T. 15, R. 2* W.

Roof; shale.
COAL, 28 in.
Fire Clay.

Thought to be the *Jefferson Seam.*

(28) *On the South-west bank of Self's creek, in the N. W. ¼ of N. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; sandstone.
COAL, *Slate ;* mixed, 6 in.
COAL, 17 in.
Shale, 3 in.
COAL, 25 in,
Shale.

Thought to be the *Jefferson Seam.*

(*29*) *On the South-west Bank of Self's Creek in the S. W. ¼ of N. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; slate.
COAL, 38 in.
Fire Clay.

This is the "*Black Creek Seam;*" the coal is of a dull color and has no luster.

(*30*) *On the North-east Side of Self's Creek, on a Small Branch in front of Mr. Samuel Faucett's Residence, in the N. W. ¼ of N. W. ¼ of S. 12, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 16 in.
Slate, 2 in.
COAL, 18 in.
Sandstone.

Thought to be the *Jefferson Seam.*

(*31*) *On the North-east Side of Self's Creek and on the West Side of Mr. Samuel Faucett's Residence, or in the N. E. ¼ of N. E. ¼ of S. 11, T. 15, R. 2 W.*

Roof; slate.
COAL, 15 in.
Fire Clay.

(*32*) *On the Right Bank of a Small Branch some ¾ mile from where it empties into Self's Creek near Mr. Samuel Faucett's Residence, or in the N. W. ¼ of S. W. ¼ of S. 1, T. 15, R. 2 W.*

Roof; shaly clay.
COAL, 32 in.
Hard shaly clay.

This is thought to be the *Black Creek Seam.*

(*33*) *In S. E. ¼ of S. E. ¼ of S 2, T. 15, R. 2 W.*

No roof.
COAL, 2 in.

Thought to be a portion of the *Jefferson Seam.*

(34) *North-east of Self's Creek about ¾ mile, or in the S. W. ¼ of N. W. ¼ of S. 1, T. 15, R. 2 W.*

Roof: slate.
COAL, 27 in.
Fire Clay.

Thought to be the *Black Creek Seam.*

(35) *In front of Mr. D. Faucett's Residence and about ½ mile North-east of Self's Creek, or in the S. W. ¼ of N. W. ¼ of S. 1, T. 15, R. 2 W.*

Roof; slate.
COAL, 20 in.
Slate, 12 in.
COAL, 16 in.
Fire Clay.

Thought to be the *Jefferson Seam.*

(36) *East of Self's Creek 1½ miles, or in the N. W. ¼ of S. W. ¼ of S. 26, T. 14, R. 2 W.*

Roof; slate.
COAL, 9 in.
Slate, 1 in.
COAL, 7 in.
Fire Clay.

(37) *South-west of Self's Creek ¾ mile, or in the S. E. ¼ of N. W. ¼ of S. 10, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 18 in.
Slate, 1 in.
COAL, 15 in,
Fire Clay.

This coal gives a white ash.

(38) *North-east of Self's Creek, ¼ mile, or in the N. E. ¼ of S. E. ¼ of S. 2, T. 15, R. 2 W.*

Roof; slate.
COAL, 8 in.
Slate, 1 in.
COAL, 4 in.
Fire Clay.

Thought to be the *Jefferson Seam.*

(39) *North-east of Self's Creek ½ mile, or in the N. W. ¼ of S. W. ¼ of S. 2, T. 15, R. 2 W.*

Roof; slate.
COAL. 9 in.
Fire Clay.

(40) *North-east of Self's Creek 100 yards, or in N. W. ¼ of N. E. ¼ of S. 2, T. 15, R. 2 W.*

Roof; slate.
COAL, 16 in.
Fire Clay.

(41) *North-east of Self's Creek ¼ mile, or in the N. W. ¼ of S. W. ¼ of S. 2, T. 15, R. 2 W.*

Roof; shaly clay.
COAL, 10 in.
Shaly Clay, 13 in.
COAL, 2 in.
Fire Clay.

(42) *North-east of Turkey Creek 1½ miles, or in the S. E. ¼ of S. 4, T. 15, R. 2 W.*

Roof; sandstone.
Clay, COAL ; mixed, 18 in.
COAL, 9 in.
Shale, 2 in.
COAL, 6 in.
Clay, 9 in.
COAL, 12 in.
Fire Clay.

Supposed to be the *New Castle Seam.*

(43) *On the Divide between Turkey and Self Creeks, One Mile North-east of Turkey Creek, or in the N. W. ¼ of S. E. ¼ of S. 9, T. 15, R. 2 W.*

Roof; sandstone.
Shale, COAL, 30 in.
Shale, 12 in.
Fire Clay, COAL, 13 in.
Shale, COAL, 24 in.
COAL, 15 in.
Slate, 2 in.
COAL, 19 in.
Shale, 2½ in.
COAL, 6 in.
Shale, 2 in.
COAL, 12 in.
Fire Clay.

Supposed *New Castle Seam.*

(44) *North-east of Turkey Creek ¾ mile, or in the N. W. ¼ of S. E. ¼ of S. 11, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 24 in.
Clay, 1 in.
COAL, 18 in.
Fire Clay, 14 in.
COAL, 36 in.
Fire Clay.

Supposed *New Castle Seam.*

(45) *North-east of Turkey Creek ¼ mile, or in the N. W. ¼ of S. E. ¼ of S. 7, T. 15, R. 2 W.*

Roof; shale.
COAL, 10 in.
Shale, COAL, 14 in.
COAL, 24 in.
Fire Clay.

Supposed *New Castle Seam.*

(46) *North-east of Self's Creek ¼ mile, or in the N. E. ¼ of N. W. ¼ of S 3, T. 15, R. 2 W.*

Roof; shale.
Clay, COAL, 10 in.
COAL, 10 in.
Clay, 2 in.
COAL, 5 in.
Sandstone.

Couldn't identify this seam.

(47) *South-west of Self's Creek ¼ mile, or in the N. E. ¼ of N. W. ¼ of S. 3, T. 15, R. 2 W.*

Roof; shale.
COAL, 8 in.
Clay.

This seam is about 20 feet above (46).

(48) *Under Falls on Beech Branch ¼ mile North-east of Turkey Creek, or in the N. W. ¼ of N. W. ¼ of S. 8, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 3 in.
Shale, 8 in.
COAL, 32 in.
COAL, *Shale*, 4 in.
Sandstone; soft.

Supposed *New Castle Seam.*

(49) *In Bottom on Side of Beech Branch ½ mile North-east of Turkey Creek, or in the N. E. ¼ of N. W. ¼ of S. 8, T. 15, R. 2 W.*

Roof; slate.
COAL, 17 in.
Shale, 1½ in.
COAL, 17 in.
Fire Clay.

Thought to be *New Castle Seam.*

(*50*) *On the Morris Station Road ¾ mile North-east of Turkey Creek, or in the S. W. ¼ of N. W. ¼ of S. 9, T. 15. R. 2 W.*

Roof; shale.
COAL, 2 in.
Shale, 1 in.
COAL, 28 in.
COAL, *shale,* 8 in.
Fire Clay.

Supposed *New Castle Seam.*

(*51*) *On Side of Morris Station Road, in Front of John Self's Residence, ⅛ mile north-east of Turkey Creek, or in the N. W. ¼ of S. W. ¼ of S. 9, T. 15, R. 2 W.*

Roof; shale.
COAL, 4 in.
COAL, *Clay,* 6 in.
COAL, 32 in.
COAL, *Shale,* 4 in.
Fire Clay.

Supposed *New Castle Seam.*

(*52*) *North-east of Turkey Creek ⅛ mile, 300 yards from (51), or in the S. W. ¼ of S. W. ¼ of S. 9, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 6 in.
Clay, 8 in.
COAL, 8 in.
Shale.

This seam is about 25 ft. above the *New Castle Seam.*

(*53*) *On Small Tributary to Beech Branch, ⅛ mile North-east of Turkey Creek, or in the N. W. ¼ of N. W. ¼ of S. 8, T. 15, R. 2 W.*

BLACK BAND ORE; estimated, 2 to 3 feet.

(54) *On Public Road ½ mile North-east of Turkey Creek, or in the N. W. ¼ of S. W. ¼ of S. 9, T. 15, R. 2 W.*

Roof; shale.
COAL, 9 in.
Clay, 1 in.
COAL, 36 in.
Fire Clay.

(55) *On Side of Hill ¾ mile North-east of Turkey Creek, or in the N. W. ¼ of S. W. ¼ of S. 11, T. 15, R. 2 W.*

Roof; sandstone.
COAL, 11 in.
Shaly Clay.

(56) *On the Side of Self's Creek in the N. W. ¼ of S. E. ¼ of S. 12, T. 15, R. 2 W.*

Roof; shale.
COAL, 2 in.
Shale.

(57) *On Small Tributary to Beech Branch ½ mile North-east of Turkey Creek, or in the N. E. ¼ of N. W. ¼ of S. 8, T. 15, R. 2 W.*

Roof; sandstone.
BLACK BAND ORE, 27 in.
Sandstone.

(58) *On Beech Branch about 200 yards above the Falls, or in the N. W ¼ of N. W. ¼ of S. 8, T. 15, R. 2 W.*

Roof; sandstone.
Shale, BLACK BAND, 22 in.
BLACK BAND, 44 in.
Shale, BLACK BAND, 10 in.
Sandstone.

This *Black Band* is about 30 ft. over the coal seam cut under *the falls*. The dip is 1° 30′ to S. 45° E. About 100 ft. higher up the ravine and 15 ft. above the test pit (58), the *Black Band* shows in a seam six inches thick and then disappears.

(59) *At Small Branch on Country Road, one mile North of Turkey Ck. and ¼ mile South of Lick Ck., or in the S. W. ¼ of S. W. ¼ of S. 4, T. 15, R. 2 W.*

Roof; shale, 12 in.
Shale, clay, 6 in.
BLACK BAND, 36 in.
Sandstone.

(60) *On Road Leading to Warrior River, ½ mile South of the River, or in the S. W. ¼ of S. E. ¼ of S. 29, T. 14, R. 2 W.*

Roof; clay.
COAL, shaly, 10 in.
Shale.

(61) *Under a Bluff, 15 ft. Hkgh of Shale, along a Branch on the Road Leading to Warrior River, about 500 feet South of the River, or in the N. W. ¼ of S. W. ¼ of S. 29, T. 14, R. 2 W.*

Roof; shale, greyish and blackish.
COAL, 15 in.
Slate, 2 in.
COAL, 9 in.
Shale; bluish grey with impressions of twigs, etc.

(62) *On Side of Country Road Leading to Warrior River, ¼ mile South of River, or in the N. W. ¼ of S. W. ¼ of S. 29, T. 14, R. 2 W.*

BLACK BAND ; out-crops, 24 in.

Cut into to a depth of 2 ft., too hard to cut through, the *Black Band* becoming more hard and shaly.

(63) *In the Bluff on the South Bank of the Warrior River, 100 ft. above the River, and 300 ft. East of Country Road, or in the S. W. ¼ of S. 29, T. 14, R. 2 W.*

Roof; shale.
COAL, 10 in.
Shale.

This coal gave out on being drifted in on 15 ft.

(64) *In the Bluff on the South Bank of the Warrior River, 75 ft. above the River and 300 ft. East of Country Road, or in the S. W. ¼ of N. W. ¼ of S. 29, T. 14, R. 2 W.*

Roof; sandstone.
COAL, shaly and inferior, 17 in.
Blue clay.

(65) *On the East Side of Self's Creek, 40 ft. above Low Water Level, in the S. W. ¼ of S. E. ¼ of S. 21, T. 14, R. 2 W.*

Roof; clay and shale.
COAL; shaly, 13 in.
COAL, 5 in.
Fire clay.

(66) *On West Bank, 75 ft. above Low Water Level, ¼ mile below Junction of Gurley and Self Creeks, or in the S. W. ¼ of N. E. ¼ of S. 21, T. 14, R. 2 W.*

Roof; shaly clay.
COAL, 10 in.
Clay, 8 in.
COAL, 4 in.
Fire clay.

Supposed *New Castle Seam.*

(67) *On West Bank, 5 ft. above Low Water Level, ¼ mile below Junction of Gurley and Self Creeks, or in the S. W. ¼ of N. E ¼ S. 21, T. 14, R. 2 W.*

Roof; shaly clay.
COAL, 13½ in.
Shaly Clay.

(68) *On the North Bank of Lick Creek in the N. E. ¼ of S. E. ¼ of S. 32, T. 14, R. 2 W.*

Roof; clay and sand, debris.
COAL, 10 in.
Clay, 7 in.
COAL, 5 in.
Fire clay.

Supposed *New Castle Seam.*

(69) *On the West Bank, 25 ft. above Low Water Level, ½ mile below the Junction of Gurley and Self Creeks, or in the S. E. ¼ of N. W. ¼ of S. 21, T. 14, R. 2 W.*

Roof; clay, shale, debris.
COAL, 15 in.
Fire clay.

(70) *On the East Bank of Self's Creek, 300 ft. South of Country Road, in the N. W. ¼ of S. E. ¼ of S. 28, T. 14, R. 2 W.*

Roof; shale.
COAL, 5 in.
Shale ; hard, with impressions of coal plants.

(71) *On East Bank of Self's Creek, ½ mile above the Crossing of Morris Station and Village Springs Road; or in the N. E. ¼ of N. E. ¼ of S. 33, T. 14, R. 2 W.*

Roof; shaly clay.
COAL, 6 in.
Slate; hard.

(72) *On West Side of Ravine 100 ft. North of Country Road and ¼ mile West of Junction of Gurley and Self Creeks, or in the N. E. ¼ of S. W. ¼ of S. 21, T. 14, R. 2 W.*

Roof; shale.
COAL, shale, 3 in.
COAL, 16 in.
Fire clay.

(73) *On the West Bank of Self's Creek, about 15 feet above Low Water Level, 300 feet North of Country Road and ½ mile above the Junction of Self and Gurley Creeks, or in the N. W. ¼ of N. E. ¼ of S. 28, T. 14, R. 2 W.*

Roof; shale.
COAL, 23 in.
Fire clay.

(74) *On a Small Branch ¼ mile South of where it runs into Turkey Creek, or in the S. W. ¼ of N. W. ¼ of S. 7, T. 15, R. 2 W.*

Roof; shale.
BLACK BAND, 6 in.
COAL, 22 in.
Shale, hard floor.

(75) *On a Small Branch ¼ mile South of where it runs into Turkey Creek, or in the S. W. ¼ of N. W. ¼ of S. 7, T 15, R. 2 W.*

Roof; sandstone.
COAL, 2½ in.
Clay, 13½ in.
COAL, 8 in.
COAL, shaly, 3½ in.
Fire Clay; floor.

(76) *In Ravine 150 yards North of Turkey Creek and 100 yards below Test Pit (75), or in the S. W. ¼ of N. W. ¼ of S. 7. T. 15, R. 2 W.*

Roof; shale.
COAL, 9 in.
Fire Clay; floor.

(77) *On the North Bank of Gurley's Creek in the S. W. ¼ of N. E. ¼ of S. 29, T. 14, R. 1 W.*

Roof; sandstone.
COAL; the lower part shaly, 24 in.

Supposed *Black Creek Seam.*

(78) *On the South Bank of Gurley's Creek in the S. W. ¼ of N. E. ¼ of S. 29, T. 14, R. 1 W.*

Roof; sandstone.
COAL; inferior, 15 in.
Shale.

(79) *On the North Bank of Gurley's Creek in the N. W. ¼ of N. E. ¼ of S. 29, T. 14, R. 1 W.*

Roof; IRON STONE, fossiliferous.
COAL; soft, 12 in.
Shale.

(80) *On the North Bank of Gurley's Creek in the S. W. ¼ of N. E. ¼ of S. 29, T. 14, R. 1 W.*

Roof; IRON STONE, fossiliferous.
COAL; inferior, 14 in.
Shale.

(81) *On the North Bank of Gurley's Creek in the S. W. ¼ of S. W. ¼ of S. 20, T. 14, R. 1 W.*

Roof; sandstone.
COAL; good, 8 in.
Shale; bituminous, 11 in.

(82) *On the South Bank of Gurley's Creek in the N. E. ¼ of N. E. ¼ of S. 30, T. 14, R. 1 W.*

Roof; sandstone.
COAL, 3¼ in.
Shale; bituminous 11 in.
Shale, 24 in.
COAL, 9 in.
Shale.

Supposed *Jefferson Seam.*

(83) *On the South Bank of Gurley's Creek in the N. E. ¼ of N. W. ¼ of S. 30, T. 14, R. 1 W.*

Roof; shale.
COAL. 13½ in.
Shale.

(84) *On a Small Branch ¼ mile from North Bank of Gurley's Creek, or in the N. E. ¼ of S. E. ¼ of S. 24, T. 14, R. 2 W.*

Roof; shale.
COAL, 32 in.
Shale.
Top Seam.

(85) *On a Small Branch ¼ mile from North Bank of Gurley's Creek, or in the N. E. ¼ of S. E. ¼ of S. 24, T. 14, R. 2 W.*

Roof; shale.
COAL, 33 in.
Shale; bituminous, 6 in.
COAL, 22¼ in.
Sandstone.

This pit is 25 feet lower than pit (84); the coal has no luster and gives a red ash. See (104).

(86) *On the South Banks of Gurley's Creek in the N. E. ¼ of N. W. ¼ of S. 25, T. 14, R. 2 W.*

Roof; clay, drift.
COAL, 14 in.
Shale.

Out-crop on summit of hill.

(87) *On the South Bank of Gurley's Creek, about 12 feet below Pit (86), in the N. E. ¼ of N. W. ¼. of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 26 in
Shale.

(88) *On the South Bank of Gurley's Creek, about 15 feet below Pit (87), in the N. E. ¼ of N. W. ¼ of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 4 in.
Shale, 12 in.
COAL, 3½ in.
Shale.

(89) *On the South Bank of Gurley's Creek in the N. W. ¼ of N. E. ¼ of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 18 in.
Shale.

Supposed to be of same seam as (84).

(90) *On Small Branch about ½ mile South of Gurley's Creek, or in the S. E. ¼ of N. W. ¼ of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 24 in.
Shale.

(91) *In the N. W. ¼ of N. E. ¼ of S. 25, T. 14, R. 2 W., near Mr. J. McComb's Residence:*

Roof; drift.
COAL, 66 in.
Shale; bituminous, 6 in.
Sandstone.

This coal has no bedded roof and doubtless some of it has been washed away. There are indications of shale near the center of the coal and the bottom portion has sulphur (pyrites) in it. This is evidently of the same seam as (85).

(92) *One mile South of Gurley's Creek, on Hill Side in the S. E. ¼ of S. E. ¼ of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 8 in.
Shale.

(93) *On a Tributary of Self's or Dry Creek, one mile North of Gurley's Creek, or in the N. W. ¼ of S. 18, T. 14, R. 1 W.*

Roof; shale.
COAL, 31½ in.
Shale.

(94) *On the South Bank of Gurley's Creek about ¼ mile below Terry's Gin, or in the N. W. ¼ of S. W. ¼ of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 14 in.
Shale, 5 in.
COAL, 8 in.
Shale.

(95) *On the North Bank of Gurley's Creek in the N. E. ¼ of S. W. ¼ of S. 24, T. 14, R. 2 W.*

Roof; shale.
COAL, 30 in.
Shale.

Supposed *Black Creek Seam.*

(96) *On the North Bank of Gurley's Creek, 30 feet above Pit (95), in the N. E. ¼ of S. W. ¼ of S. 24, T. 14, R. 2 W.*

Roof; sandstone.
COAL, 4 in.
Shale, 11 in.
COAL, 9 in.
Shale.

(97) *On the North Side of Gurley's Creek, about 100 yards East of Smith's Mill, in the S. W. ¼ of N. W. ¼ of S. 24, T. 14, R. 2 W.*

Roof; shale.
COAL, 2½ in.
Shale, 3 in.
COAL, 14 in.
Shale.

(98) *On a Small Branch, ½ mile South of Gurley's Creek, or in the N. W. ¼ of S. W. ¼ of S. 24, T. 14, R. 2 W.*

Roof; drift.
COAL, 14½ in.
Shale; bituminous, 7 in.
COAL, 3 in.
Shale.

(99) *On the North Bank of Gurley's Creek in the N. E. ¼ of N. E. ¼ of S. 23, T. 14, R. 2 W.*

Roof; shale.
COAL, 2 in.
Shale, 1½ in.
COAL, 11½ in.
Shale.

(100) *At Low Water Level on the North Bank of Gurley's Creek in the N. E. ¼ of N. E. ¼ of S. 23, T. 14, R. 2 W.*

Roof; shale.
Shale; bituminous, 4 in.
COAL, 16½ in.
Shale.

Supposed *Black Creek Seam.*

(101) *On the North Bank of Gurley's Creek, 30 feet above Pit 100, in the N. E. ¼ of N. E. ¼ of S. 23, T. 14, R. 2 W.*

Roof; shale.
Shale; bituminous, 18 in.
COAL, 13 in.
Shale, 11 in.
COAL, 6 in.
Shale; floor.

(102) *On the North Side of Gurley's Creek, about 100 yards from Terry's Gin, in the S. W. ¼ of S. E. ¼ of S. 24, T. 14, R. 2 W.*

Roof; shale, evidently disturbed.
COAL, 24 in.
Shale.

(103) *On the North Side of Gurley's Creek, 150 yards below Terry's Gin and about 20 feet under Pit (88), in the N. E. ¼ of N. W. ¼ of S. 25, T. 14, R. 2 W.*

Roof; shale.
COAL, 18 in.
Shale; blue and soft.

Dip 2° 3′ to N. 45° W.

(104) *On Small Branch ½ mile from Gurley's Creek, or in the N. E. ¼ of S. E. ¼ of S. 24, T. 14, R. 2 W.*

Roof; shale.
COAL, 33 in.
Shale, 3½ in.
COAL, 6 in.
Shale, 3 in.
COAL, 12 in.
Sandstone; floor.

This is a section of the same pit as (85) drifted into about 10 feet further. It is the supposed *New Castle Seam.* The dip is 2° 30′ to N. 85 W.

(*105*) *Near Mr. James McCombs' residence and 10 yards from Pit* (*91*), *in the N. W. ¼ of N. E. ¼ of S. 25, T. 14, R. 2 W.*

Roof; drift.
COAL, 41 in.
Shale, 2 in.
COAL, 7 in.
Shale, 2 in,
COAL, 20 in.
Sandstone; floor.

Supposed *New Castle Seam.*

(*106*) *On a Small Branch ½ mile South of Self's Creek, in the N. E. ¼ of S. E. ¼ of S. 33, T. 14, R. 2 W.*

Roof; shale.
COAL, *clay*, 3 in.
Shale, 18 in.
COAL, 10 in.
Fire Clay, 1½ in.
COAL, 2 in.
Shale; floor.

Supposed *New Castle Seam.*

(*107*) *On a Small Branch ¾ mile South of Self's Creek, in the N. W. ¼ of N. E. ¼ of S. 4, T. 15, R. 2 W.*

Roof; shale.
COAL, 12 in.
Fire Clay, 1 in.
COAL, 38 in.
Shale, floor.

Dip, easterly 3° 10′.

(*108*) *In a Ravine extending down to a Branch of Self's Creek, ½ mile North-east of the Creek, or in the S. W. ¼ of S. E. ¼ of S. 23, T. 14, R. 2 W.*

Roof; shale.
COAL, 10 in.
Clay, 1½ in.
COAL, 5 in.
Sandstone; floor.

(*109*) *On an E. and W. Branch of Self's Creek, 200 feet from the Branch and ¼ mile from its mouth and 75 feet from an Old House, or in the S. E. ¼ of S. E. ¼ of S. 34, T. 14, R. 2 W.*

Roof; shaly clay.
COAL, 9 in.
Fire Clay; floor.

This pit is near summit of hill.

(*110*) *On Side of a Branch ¼ mile East of Self's Creek, or in the S. E. ¼ of S. E. ¼ of S. 34, T. 14, R. 2 W.*

Roof; shale.
COAL, 9 in.
Fire Clay; floor.

(*111*) *On the Side of the Morris Station and Village Springs Road, ¼ mile West of Mr. J. P. Hughes' Residence, or in the S. W. ¼ of S. W. ¼ of S. 27, T. 14, R. 2 W.*

Roof; Clay.
COAL, 2½ in.
Clay; shaly, 18 in.
COAL, 3 in.
Fire Clay; floor.

(*112*) *On Morris Station and Village Springs Road, 200 yards West of Mr. J. P. Hughes' Residence, or in the S. W. ¼ of S. W. ¼ of S. 27, T. 14, R. 2 W.*

Roof; drift.
COAL, 10 in.
Fire Clay; floor.

(*113*) *In the S. E. ¼ of S. E. ¼ of S. 33. T. 14, R. 2 W.*

Roof; clay.
COAL, 9 in.
Shale, clay, 3 in.
COAL, 8 in.
Shale, 7¼ in.
COAL, 7 in.
Clay, 3¾ in.
COAL, 15½ in.
Shaly clay; floor.

The coal of this seam, like others, has in it thin layers of *mineral charcoal;* it crumbles on handling, and has a dull color, without luster, and gives a white ash. Supposed *New Castle Seam.* The dip is 2° 10′ to East.

(*114*) *On West Bank, 75 feet above Low Water Level, of a Small Branch of Self's Creek, or in the S. E. ¼ of S. E. ¼ of S. 7, T. 15, R. 1 W.*

Roof; shaly clay.
COAL, 8 in.
Fire clay; floor.

(*115*) *On the East Bank of Small Branch of Self's Creek ¼ mile higher up the Branch than Pit* (*114*), *or in the N. E. ¼ of S. E. ¼ of S. 7, T. 15, R. 1 W.*

Roof; shale.
COAL, *sandstone;* mixed, 9 in.
Shale; yellow, floor.

(*116*) *On Prong of North Creek, 30 feet higher topographically than Pit* (*3*), *in the S. W. ¼ of S. W. ¼ of S. 26, T. 15, R. 2 W.*

Roof; clay.
COAL, *clay*, 11½ in.
COAL, 3½ in.
Clay, 5 in.
COAL, *clay*, 39½ in.
COAL, 6 in.
COAL, *clay*, 1½ in.
COAL, 15½ in.
COAL, *clay*, 8 in.

This is thought to be the *New Castle Seam* and the same as Pit (3).

(*117*) *On the North Bank of Turkey Creek from ¼ to ½ mile above Glenn's Mill, or in the S. W. ¼ of S. E. ¼ of S. 14, T. 15, R. 2 W.*

Roof; drift.
Clay; BLACK BAND; mixed, 66 in.
COAL, 6½ in.
Shale, 2½ in.
COAL, 6 in.
Shale; floor.

This pit was drifted in about 15 feet. Supposed *New Castle Seam.* Dip, 5° 30″ to S. W.

(12) On Beech Branch about 225 yards above the Falls and Pit 18, or in the N. W. ¼ of N. W. ¼ of S. E. T. 15, R. 2 W.

A test pit dug under a small seam of *black band* and carried down to the level of seam in pit (55) exposed no sign of *black band*. The *black band* of pit 55, was exposed and traced to face. In pit (55), the dip was 1° 30′ to S. 45° E. and 12 feet to the north it was 9° 30′ N. W.

(13) On Jasper Road in the S. E. ¼ of S. E. ¼ of S. 5 T. 15, R. 2 W.

A surface seam of a few inches in thickness of *Spathic Iron Ore*. It also shows about ¼ mile farther to the east. It is of no value.

(120), On the South-west Bank of a Small Branch of Turkey Creek about ¼ mile from the creek, or in the N. W. ¼ of S. W. ¼ of S. 24 T. 15, R. 2 W.

Roof; hard curly shale.
COAL, 33 in.
Shale; floor.

Supposed *Pierce or Warrior Seam.*

(121), On the South Bank of Turkey Creek ¼ mile below Pit (120) and 20 feet above Pit (8), in the S. W. ¼ of N. E. ¼ of S. 24, T. 5, R. 2 W.

Roof; shale.
BLACK BAND, 24 in.
COAL, 6 in.
Clay, 1 in.
COAL, 5 in.
Clay, 13 in.
COAL, 3 in.
Clay, 1½ in.
COAL, 5½ in.
Clay, ½ in.
COAL, 7 in.
COAL, *clay*, 4 in.
Shale; floor.

Supposed *New Castle Seam.*

(*122*) *In Bluff on the South Bank of Turkey Creek, 30 feet below Pit* (*121*), *in the S. W. ¼ of N. E. ¼ of S. 24, T. 15, R. 2 W.*

Roof; shale.
COAL, *clay*, 12 in.
COAL, 6½ in.
Clay, 3½ in.
COAL, 15 in.
Fire clay; floor.

Supposed *Jefferson Seam.* This pit is the same as pit (8) re-cut.

(*123*) *On the South Bank of Turkey Creek, at Low Water Level, about 30 feet below Pit* (*122*), *in the S. W. ¼ of N. E. ¼ of S. 24, T. 15, R. 2 W.*

Roof; hard curly shale.
COAL, 26½ in.
Fire clay; floor.

This is pit (9) re-cut. Supposed *Black Creek Seam* or *Hanby Old Mill Seam* of pit (6).

(*124*) *Near Mr. John Hudson's Residence, on the South Side of Self's Creek, some 400 feet from the Creek, or in the N. E. ¼ of N. E. ¼ of S. 18, T. 15, R. 1 W.*

Roof; clay.
COAL, 12 in.
Clay; floor.

(*125*) *On the South Side of Self's Creek, on a Small Branch in the S. W. ¼ of N. W. ¼ of S. 18, T. 15, R. 1 W.*

Roof; shale.
COAL, 14 in.
Shale; floor.

(*126*) *On South Side of Self's Creek, on a Small Branch in the N. W. ¼ of N. W. ¼ of S. 18, T. 15, R. 1 W.*

Roof; shale.
COAL, 1 in.
Shale; floor, 39 in.
BLACK BAND, 8 in.
Shale; floor.

(127) *In R. R. Cut in the N. W. ¼ of N. W. ¼ of S. 18, T. 15, R. 1 W.*

Roof; shale.
COAL, 3 in.
Shale; floor.

(128) *Out-crops on the South Bank of Flat Creek in the S. E. ¼ of S. E. ¼ of S. 18, T. 15, R. 2 W.*

Roof; shale.
COAL, shaly, 6 in.
COAL, 13 in.
Slate; streak.
COAL, 10 in.
Slate; streak.
COAL, 6 in.
Shale; floor.

Supposed *New Castle Seam.* Dip 5° 20′ E.

(129) *On the Jasper Road and on the South Bank of Turkey Creek in the N. W. ¼ of N. E. ¼ of S. 25, T. 15, R. 2 W.*

Roof; shale.
COAL, 15 in.
Shale; floor.

Dip, 11° 20′ to N. 45° W.

(130) *On South Bank of South Prong of Dry Creek in the N. E. ¼ of N. W. ¼ of S. 17, T. 14, R. 1 W.*

Roof; shale.
COAL, 1 in.
Shale; floor.

(131) *On South Bank of South Prong of Dry Creek about 450 feet below Pit (130) or in the N. E. ¼ of N. W. ¼ of S. 17, T. 14, R. 1 W.*

Roof; shale.
COAL, 3 in.
Shale; floor.

(132) *On Small Branch ¼ mile South of South Prong of Dry Creek, or in the N. W. ¼ of N. E. ¼ of S. 17, T. 14, R. 1 W.*

Roof; shale.
COAL, 12 in.
Shale; floor.

(*133*) *On South Prong about ¼ mile South of Dry Creek, or in the N. E. ¼ of N. W. ¼ of S. 17, T. 14, R. 1 W.*

Roof; shale.
COAL, 8 in.
Shale; floor.

(*134*) *On the North Bank of North Prong of Dry Creek in the N. E. ¼ of S. 8, T. 14, R. 1 W.*

Roof; shale.
COAL, 12½ in.
Shale; floor.

(*135*) *On the North Bank of North Prong of Dry Creek in the N. E. ¼ of S. 8, T. 14, R. 1 W.*

Roof; shale.
COAL, 5½ in.
Shale; floor.

(*136*) *On the South Bank of North Prong of Dry Creek in the S. W. ¼ of N. W. ¼ of S. 8, T. 14, R. 1 W.*

Roof; shale.
COAL, 6 in.
Shale; floor.

(*137*) *About ¼ mile north of Dry Creek, in the N. W. ¼ of N. E. ¼ of S. 12, T. 14, R. 2 W.*

Roof; shale.
COAL, *clay*, 8 in.
Shale, 5 in.
COAL, shale, 8 in.
COAL, 6 in.
COAL; streak, 1⅛ in.
COAL, 53½ in.
Shale; bituminous, 10 in.
COAL, 21 in.
BLACK BAND, 8 in.
Sandstone; floor.

Supposed *New Castle Seam.* Dip, 30° 20′ to N. 30° E. See (143).

(138) *North of Dry Creek ½ mile in the N. E. ¼ of N. W. ¼ of S. 12, T. 14, R. 2 W.*

COAL, 1 in.
Clay, 1½ in.
COAL, 2½ in.
Clay, 1 in.
COAL, 36 in.
Shale, floor.

Dip 1° to E.

(139) *About 900 feet North of Pit (137), in the N. W. ¼ of N. E. ¼ of S. 12, T. 14, R. 2 W.*

Roof; clay.
COAL, *clay*, 6½ in.
Shale, 3½ in.
COAL, 5 in.
Clay; shaly, 2½ in.
COAL, 2½ in.
Shale, streak.
COAL, 26 in.
Shale; floor.

Supposed *New Castle Seam.* Dip, 3° to N. 6 ½° W.

(140) *About 600 feet North-west of Pit (137) and 50 feet higher, in the N. W. ¼ of N. E. ¼ of S. 12, T. 14, R. 2 W.*

Roof; drift.
COAL, 12 in.
Shale; floor.

This seam has evidently been disturbed. The dip varies.

(141) *About 300 yards North of Blount Springs Road, on a Small Tributary to Long Branch, or in the N. E. ¼ of N. E ¼ of S. 2, T. 14, R. 2 W.*

Roof; shale.
COAL, *shale ;* the shale in pieces, 8 in.
COAL, 23 in.
Shale ; floor.

This coal has been used for years by black-smiths from Blount Springs, Blountsville, etc.

(*142*) *About 200 yards South of Blount Springs Road, opposite Dallas Morton's Residence, or in the N. E. ¼ of N. E. ¼ of S. 2, T. 14, R. 2 W.*

Roof; shale.
COAL, 5 in.
Fire clay.

This pit is some 20 feet barometrically higher than pit (141).

(*143*) *Same Pit as* (*137*) *drifted into to solid cover, in the N. W. ¼ of N. E. ¼ of S. 12, T. 14, R. 2 W.*

Roof; shale.
COAL, 5 in.
COAL; shaly, 1¼ in.
COAL, 3 in.
Slate; streak.
COAL, 13 in.
Slate; streak.
COAL, 3 in.
COAL; shaly, 1½ in.
COAL, 33 in.
Shale; bituminous, 10 in.
COAL, 20 in.
BLACK BAND, 7 in.
Slate; hard.

This coal has no luster and is partly curly and laminated, add has near its bottom small fragments of pyrites. The supposed *New Castle Seam.*

(*144*) *At the Head of a Small Branch, ½ mile South of Long Branch and ¼ mile North of Blount Springs Road, or in the S. W. ¼ of N. W. ¼ of S. 6, T. 14, R. 1 W.*

Roof; shale.
COAL; shaly, 7 in.
Shale, 6 in.
COAL, 23 in.
Shale, floor.

Perhaps *Jefferson Seam.* Dip, 4° 30' N. E.

(145) *About 1,000 feet North of the Blountsville Road, in a Ravine extending down to Long Branch, or in the S. E. ¼ of N. E. ¼ of S. 6, T. 14, R. 1 W.*

Roof; shale.
COAL; shaly, 9½ in.
Shale, 4½ in.
COAL, 3 in.
Clay, 1 in.
COAL, 26 in.
Shale; floor.

Supposed *New Castle Seam.*

(146) *On the Divide between Gurley's and Dry Creek, in the S. E. ¼ of N. W. ¼ of S. 13, T. 14, R. 2 W.*

Roof; shale.
COAL, 9 in.
Shale, 10 in.
COAL, 18 in.
Shale; floor.

(147) *On a Small Branch of Dry Creek, in the N. E. ¼ of S. W. ¼ of S. 18, T. 14, R 1 W.*

Roof; sandstone.
COAL, 46½ in.
Shale, 16 in.
COAL, 13 in.
BLACK BAND, 17½ in.

This is of the same seam as pits (85) and (91), and is 20 feet barometrically above (93). It is mixed with *black band ore* and pieces of iron sulphide. Supposed *New Castle Seam.*

(148) *On the South Side of Blount Springs Road, and on the North Bank of Dry Creek about 600 feet from its Mouth or the Warrior River, or in the N. E. ¼ of N. W. ¼ of S. 10, T. 14, R. 2 W.*

Roof; shale.
COAL; shaly, 11 in.
COAL, 28 in.
Shale; floor.

(149) *On the North Side of Blount Springs Road, 150 feet East of Pit (149) and 30 feet higher, in the N. E. ¼ of N. W. ¼ of S. 10, T. 14, R. 2 W.*

Roof; drift.
COAL, 17 in.
Shale, floor.

This pit is near the top of the divide between Long Branch and Dry Creek.

(150) *In Bluff on the South Bank of Dry Creek in the N. W. ¼ of N. W. ¼ of S. 11, T. 14, R. 2 W.*

Roof; shale.
COAL; shaly, 7½ in.
COAL, 24 in.
Shale ; floor.

(151) *About 550 feet North of Dry Creek, in the S. W. ¼ of N. E. ¼ of S. 11, T. 14, R. 2 W.*

Roof; shale.
COAL; shaly, 5½ in.
Shale, 4 in.
COAL; shaly, 11 in.
Shale, 22 in.
COAL, 26 in.
Shale; floor.

This coal is firm and laminated. Supposed *New Castle Seam.*

(152) *About ¾ mile West of the Blountsville Road, on the South side of Long Branch in the N. E. ¼ of S. 5, T. 14, R. 1 W.*

Roof; shale.
COAL, 2 in.
Clay, 2 in.
COAL, shaly, 5 in.
Clay, 9 in.
COAL, *clay*, 2 in.
Clay, 2 in.
COAL, 26½ in.

This pit is near the top of a high ridge. Supposed *New Castle Seam.*

(153) *About ¼ mile West of Pit (152), in the S. N. ¼ of S. 5, T. 14, R. 1 W.*

Roof; drift.
COAL, 18 in.
Shale; floor.

This coal is near the top of the hill and has been badly weathered.

(154) *About 150 yards North-west of Reede's residence, in the N. W. ¼ of N. W. ¼ of S. 4 T. 14, R. 1 W.*

Roof; shale.
COAL, 3 in
Shale; floor.

Dip, 9° 40′ to N. 25° W.

(155) *On a Small Branch, 750 yards North-west of Dry Creek, in the S. W. ¼ of S. 4, T. 14, R. 1 W.*

Roof; slate.
COAL, 6 in.
Shale; floor.

Dip, 9° 10′ to N. 45° W.

(156) *South of Dry Creek about ½ mile, in the N. E. ¼ of S. 20, T. 14, R. 1 W.*

Roof; shale.
COAL, 14 in.
Shale; floor.

This coal is bony. Dip, 10° 20′ to N. 45° W.

(157) *South of Pack-saddle Creek ¼ mile and North of Warrior Road 500 feet, in the N. W. ¼ of S. E. ¼ of S. 30, T. 13, R. 1 W.*

Roof; clay.
COAL, *clay,* 3 in.
Clay, 3 in.
COAL, 29 in.
Clay; floor.

This coal has a *face and butt structure,* and is hard and bright. Supposed *Jefferson Seam.*

(158) *On the South Bank of Pack-saddle or White's Creek, ¼ mile from its Mouth or the Warrior River, or in the S. W. ¼ of N. W. ¼ of S. 30, T. 13, R. 1 W.*

Roof; slate.
COAL, 7 in.
Slate; floor.

This coal has a *face and butt structure*, and is hard and bright.

(159) *About ¼ mile South of Pack-saddle Creek and 500 feet North of Warrior Road, in the S. W. ¼ of S. E. ¼ of S. 25, T. 13, R. 2 W.*

Roof; drift.
COAL, 2½ in.
COAL, *clay*, 6 in.
COAL, 28 in.
Shale; floor.

This coal is badly weathered and broken up.

(160) *About ¾ mile East of the Warrior River and ¼ mile South of Pack-saddle Creek, in the N. W. ¼ of N. W. ¼ of S. 25, T. 13, R. 2 W.*

Roof; shale.
COAL, *clay*, 9½ in.
COAL, 28 in.
Shale; floor.

This coal is bright and hard, and breaks up in cubes.

(161) *South-west of Pit (160) 700 feet, in the N. W. ¼ of N. W. ¼ of S. 25. T. 13, R. 2 W.*

Roof; shale.
COAL, *clay*, 12 in.
COAL, 25 in.
Shale; floor.

This coal has a *face and butt structure*, and is hard and bright.

(162) *About ¼ mile West of Pit (161) and 75 feet lower, in the S. W. ¼ of S. W. ¼ of S. 26, T. 13, R. 2 W.*

Roof; shale.
COAL, shaly, 3 in.
Shale, 2 in.
COAL, 3 in.
Shale; floor.

(162½) *About 50 feet South of Warrior Station Road ½ mile West of crossing of Pack-saddle Creek, or in the S. W. ¼ of S. E. ¼ of S. 30, T. 13, R. 1 W.*

Roof; drift.
Clay.
COAL, *clay,* 10½ in.
COAL, 34 in.
Clay; floor.

This coal is badly weathered and broken up; the pieces have a *face and butt structure.* Dip, 1° to N.

(163) *Neac Old School House, in a ravine 300 yards West of Township Road, in the N. E. ¼ of S. 31, T. 13, R. 1 W.*

Roof; drift.
Clay.
COAL, *clay,* 10 in.
COAL, 26 in.
Clay; floor.

This pit is within 20 feet of top of hill. The weather worn pieces show a *face and butt structure.*

(164) *About 300 feet North of Old School House and 100 feet East of Country Road, in the N. E. ¼ of S. 31, T. 13, R. 1 W.*

Roof; clay, sandstone.
COAL, 9 in.
Clay; floor.

This coal has been disturbed or broken up.

(*165*) *On side of Country Road in the S. E. ¼ of S. 31, T. 13, R. 1 W.*

Roof; clay.
COAL, *clay*, 8 in.
COAL, 14 in.
Clay, floor.

This coal is badly weathered.

(*166*) *Near East Bank of Warrior River, on side of Settlement Road, in the N. W. ¼ of S. 17, T. 13, R. 1 W.*

Roof; drift.
COAL, 4½ in.
Clay, shaly.

(*167*) *In Bluff on the South Bank of the Warrior River in the N. W. ¼ of S. 17, T. 13, R. 1 W.*

Roof; shale.
COAL, 8½ in.
Shale; floor.

(*168*) *On the East Bank of Hall Mark Creek in the S. W. ¼ of S. 16, T. 13, R. 1 W.*

Roof; slate.
COAL, 5½ in.
Slate.

This coal is hard and bright.

(*169*) *On the South side of Hall Mark Creek in the S W. ¼ of S. 17, T. 13, R. 1 W.*

Roof; shale.
COAL, 6¾ in.
Clay, shaly.

(*170*) *On the South Bank of Hall Mark Creek 150 feet from its mouth or the Warrior River, in the S. W. ¼ of S. W. ¼ of S. 17, T. 13, R. 1 W.*

Roof; slate.
COAL, 7⅓ in.
Clay; shaly.

This coal is hard and bright.

(171) *On the North Bank of Pack-saddle or White's Creek, in the N. E. ¼ of N. W. ¼ of S. 28, T. 13, R. 1 W.*

Roof; slate.
COAL, 5½ in.
Slate; floor.

(172) *Under Bluff on the South Bank of Pack-saddle or White's Creek in the S. E. ¼ of N. W. ¼ of S. 28, T. 13, R. 1 W.*

Roof; slate.
COAL, 4 in.
Slate.

(173) *In Bluff of Locust Fork of Little Warrior River, South-east of Road and about 300 feet from Pine Bluff Church, or in the S. E. ¼ of S. W. ¼ of S. 14, T. 13, R. 1 W.*

Roof; slate.
COAL, 2 in.
Slate.

(174) *Some 900 feet West of the Blountsville Road on a Small Branch in the S. W. ¼ of S. E. ¼ of S. 4, T. 13, R. 1 W.*

Roof; shale.
COAL, 1½ in.
Shale; floor.

(175) *East of Locust Fork of Little Warrior about ¼ mile in S. W. ¼ of N. W. ¼ of S. 8. T. 13, R. 1 W.*

Roof; shale.
COAL, 7 in.
Shale; bituminous, floor.

(176) *Under a Bluff 75 feet South of Locust Fork of Little Warrior River in the S. W. ¼ of N. E. ¼ of S. 4, T. 13, R. 1 W.*

Roof; slate.
COAL, 5 in.
Slate; floor.

This coal is hard and bright and has a *face and butt structure.*

(177) *Under a Bluff on a Branch in the S. E. ¼ of S. 5, T. 13, R. 1 W.*

Roof; slate.
COAL, 7½ in.
Slate; floor.

(178) *On a Small Branch, ¼ mile of Little Warrior River and 150 feet South of Plantation Road, in the N. E. ¼ of S. E. ¼ of S. 4, T. 13, R. 1 W.*

Roof; slate.
BLACK BAND, 15 in.
Slate; floor.

(179) *South of the Warrior River ¼ mile on a Small Branch in the S. E. ¼ of N. E. ¼ of S. 4, T. 13, R. 1 W.*

Roof; slate.
BLACK BAND, 13 in.
Slate; floor.

This pit is about 250 feet down the branch from pit (178).

(180) *Some 400 feet South of Mr. J. C. Glasscock's Residence, in a well at the Shingle Mill in the N. E. ¼ of S. W. ¼ of S. 11, T. 13, R. 1 W.*

Roof; slate.
COAL, 3½ in.
Slate; floor.

(181) *Some 600 feet South of Little Warrior River under a Bluff on a Branch in the S. E. ¼ of N. E. ¼ of S. 11, T. 13, R. 1 W.*

Roof; slate.
COAL, 6 in.
Slate.

This coal is hard and bright.

(182) *On the North Bank of Pack-saddle or White's Creek, in the N. W. ¼ of S. W. ¼ of S. 27, T. 13, R. 1 W.*

Roof; slate.
COAL, 6 in.
COAL; shaly, 2½ in.

This coal is bright and hard.

(183) *On the North Bank of Pack-saddle or White's Creek 15 feet above Low Water Level in the N. W. ¼ of S. E. ¼ of S. 28, T. 13, R. 1 W.*

Roof; slate.
COAL; shaly, 6 in.
COAL, 4 in.

(184) *On the East Bank of Dry Creek about ¾ mile from its Mouth or the Warrior River, or in the N. E. ¼ of S. 26, T. 12. R. 1 W.*

Roof; slate.
COAL, 4 in.
Slate; floor.

This coal is hard, bright and curly.

(185) *On the West Bank of Dry Creek ¼ mile below the Ford of a Country Road and ¼ mile from its mouth or the Warrior River, or in the S. E. ¼ of S. 34, T. 12, R. 1 W.*

Roof; slate.
COAL; bony, 5 in.
Slate; floor.

(186) *About 400 feet East of the Blountsville Road on a Small Branch at the Dripping Spring in the S. E. ¼ of N. E. ¼ of S 25, T. 12, R. 1 W.*

Roof; slate.
COAL, 2 in.
COAL, *slate*, 4½ in.
Slate; floor.

This coal is hard and glossy.

(187) *One Mile East of Crossing of Dry Creek by Blountsville Road and 300 feet South of this Creek, near the Top of the Mountain in the N. E. ¼ of S. E. ¼ of S. 19, T. 12, R. 1 E.*

Roof; shale.
COAL, 6½ in.
Shale, clay; floor.

(187½) *On a Branch about ¼ mile from its Mouth or from Dry Creek, or in the S. W. ¼ of S. E ¼ of S. 19, T. 12, R. 1 E.*

Roof; clay and shale.
COAL, 6 in.
Slate; floor.

This coal is hard and glossy.

(188) *About 150 feet higher up the Branch than Pit (187), in the S. W. ¼ of S. E. ¼ of S. 19, T. 12, R. 1 E.*

Roof; clay.
COAL, 2 in.
Clay, slate; floor.

This coal is very soft and impure.

(189) *About 800 feet South of the Chepultepec Road under a Small Bluff at a Dripping Spring in the N. E. ¼ of N. E. ¼ of S. 30, T. 12, R. 1 E.*

Roof; slate.
COAL, 4 in.
Slate, floor.

This coal is hard and bright.

(190) *At the Spring 300 feet South of Mr. Sutherland's Residence, known as the Holly Place, in the S. W. ¼ of N. W. ¼ of S 29, T. 12, R. 1 E.*

Roof; shale.
COAL, 12 in.
Clay, 2½ in.
COAL, 1½ in.
Sandstone; floor.

This coal is hard and has a good luster.

(191) *About ¼ mile from Miss E. Walker's Residence and 20 feet East of Little Warrior River in the S. W. ¼ of S. 28, T. 12, R. 1 E.*

Roof; drift.
COAL, 8½ in.
Slate; floor.

This coal is hard and curly, and has in it traces of iron pyrites.

(192) *About ½ mile South of Mr. S. D. Reese's Residence in a Small Gully in the N. W. ¼ of S. W. ¼ of S. 20, T. 12, R. 1 E.*

Roof; shale.
COAL, 5 in.
Shale.

This coal is hard and bright, and has a *face and butt structure.*

(193) *About ½ Mile North of Mr. S. D. Reese's Residence on a Small Branch in the S. W. ¼ of N. W. ¼ of S. 20, T. 12, R. 1 E.*

Roof; shale.
COAL, 2 in.
Clay, floor.

(194) *About 500 feet South east of Dry Creek in a Gully on the Mountain in the S. W. ¼ of S. E. ¼ of S. 17, T. 12, R. 1 E.*

Roof; shale.
COAL, 11 in.
Sandstone; floor.

This coal is weathered and soft.

(195) *North of Little Warrior River about ½ mile, in the S W. ¼ of N. E. ¼ of S.* 6, *T. 13, R. 1 E.*

Roof; shale.
COAL, 10 in.
Shale, 4 in.

This coal is hard and bright.

(196) *On West Bank of Small Branch of Little Warrior River, in the S. W. ¼ of N. E. ¼ of S 5. T. 13, R. 1 E.*

Roof; shale.
COAL, 9 in.
Shale, 2 in.
COAL, 12 in.
Shale; floor.

(197) *About 800 feet West of Little Warrior River, on the Blountsville Road in the S. W. ¼ of N. E. ¼ of S. 1, T. 13, R. 1 W.*

Roof; shale.
COAL, 6 in.
Shale, floor.

(198) *In the N. E. ¼ of S. 30, T. 12, R. 1 E.*

Roof; shale.
COAL, 12 in.
Shale.

(199) *West of Little Warrior about ¼ mile, in the S. E. ¼ of S. W. ¼ of S. 28, T. 12, R. 1 E.*

Roof; shale.
COAL, 9½ in.
Shale; floor.

(200) *West of Little Warrior River ¼ mile on a Ridge in the S. E. ¼ of S. W. ¼ of S. 11, T. 12, R. 1 E.*

Roof; shale.
COAL, 21 in.
Shale; floor.

This coal has no luster and is hard; it gives a red ash.

(201) *In the N. W. ¼ of S. E. ¼ of S. 15, T. 12, R. 1 E.*

Roof; shale.
COAL, 21 in.
Shale; floor.

This coal has no luster and is hard.

(202) *Back of Mr. M. T. Self's Residence, in the S. E. ¼ of S. W. ¼ S. 10, T. 12, R. 1 E.*

Roof; shale.
COAL, 23 in.
Shale; floor.

(203) *In the S. E. ¼ of S. W. ¼ of S. 10, T. 12, R. 1 E.*

Roof; shale.
COAL, 6 in.
Shale; floor.

About 100 feet topographically above pit (202) and within 30 feet of the top of Berry Mountain.

(204) *On the West Bank of the Warrior River in the S. E. ¼ of S. E. ¼ of S. 15, T. 12, R. 1 E.*

Roof; shale, hard and curly.
COAL, 24 in.
Shale; floor.

This coal has no luster and gives a red ash.

(205) *In the S. E. ¼ of S. E. ¼ of S. 16, T. 12, R. 1 E.*

Roof; shale.
COAL, 4 in.
Shale; floor.

This pit is about 15 feet vertically above pit (204).

(206) *Near the Top of Berry Mountain on the East Side in the N. W. ¼ of N. E. ¼ of S. 1, T. 12, R. 1 E.*

Roof; shale.
COAL, 6 in.
Shale; floor.

(207) *At the Foot of Berry Mountain on the East side in the S. E. ¼ of N. E. ¼ of S. 1, T. 12, R. 1 E.*

Roof; shale.
COAL, 15 in.
Shale; floor.

(208) *Near the Foot of Berry Mountain on the East side in the S W. ¼ of N. E. ¼ of S. 1, T. 12, R, 1 E.*

Roof; shale.
COAL, 15 in.
Shale; floor.

(209) *On the West side of Puncheon Branch in the S. E. ¼ of S. W. ¼ of S. 30, T. 11, R. 2 E.*

Roof; shale, hard and blue.
COAL, 18 in.
Shale; floor.

This coal is hard and bright.

(*210*) *On a Small Branch of Warrior River, in the S. W. ¼ of S. W. ¼ of S. 30, T. 11, R. 2 E.*

Roof; shale.
COAL, 15 in.
Shale; floor.

(*211*) *On the North Slope of Berry Mountain, in the N. E. ¼ of N. W. ¼ of S. 31, T. 11, R. 2 E.*

Roof; shale.
COAL, 18 in.
Shale; floor.

(*212*) *In a Ravine on the North side of Berry Mountain or in the S. W. ¼ of N. W. ¼ of S. 31, T. 11, R. 2 E.*

Roof; shale.
COAL, 25 in.
Shale; floor.

(*213*) *Some 500 feet South-east of Dry Creek in Gully in the Mountain in the S. W. ½ of S. E. ¼ of S. 17, T. 12, R. 1 E.*

Roof; shale.
COAL, 11 in.
Sandstone; floor.

(*214*) *About ¼ mile East of Blountsville Road on the East side of a Small Hill in the S. W. ¼ of S. E. ¼ of S. 7, T. 12, R. 1 E.*

Roof; slate, argillaceous.
COAL, 9 in.
Clay; bluish, floor.

This coal is soft and weathered.

(*215*) *About 400 feet North of Pit (214), in the S. W. ¾ of S. E. ¼ of S. 7, T. 12, R. 1 E.*

Roof; shale.
COAL, 4½ in.
Shale; floor.

This pit is 40 feet higher topographically than pit (214).

(216) *On Side of the Hill about 300 feet South of A. W. Fowler's Residence, or in the N. W. ¼ of S. E. ¼ of S. 29, T. 11, R. 2 E.*

Roof; fire clay.
COAL, 4½ in.
COAL, *clay*, 2 in.
COAL, 15 in.
Slate; floor.

Upper part of the seam is soft and the lower part is hard and bright.

(217) *In Bed of Branch ¼ mile North of Amos Fowler's Residence, or in the N. W. ¼ of S. E. ¼ of S. 20, T. 11, R. 2 E.*

Roof; slate.
COAL, 10 in.
Clay; hard, floor.

(218) *About ½ mile North-east of Mr. A. W. Fowler's Residence, on the North-east side of Foust Mountain in the S. W. ¼ of S. E. ¼ of S. 20, T. 11, R. 2 E.*

Roof; arenaceous shale.
COAL, 5 in.
Clay, ½ in.
COAL, 10 in.

(219) *About 800 feet West of Mr. A. W. Fowler's Residence, on the Side of the Mountain in the S. W. ¼ of S. E. ¼ of S. 20, T. 11, R. 2 E.*

Roof; clay.
COAL, 6 in.
Clay, ½ in.
COAL, 6 in.

This coal is weathered.

(220) *Some 300 feet South of Mr. A. Brand's Residence, in a Gully on a Hill Side in the N. W. ¼ of N. W. ¼ of S. 21, T. 11, R. 2 E.*

Roof; clay.
COAL, 2½ in.
Clay, 14 in.
COAL, 3 in.
Clay; floor.

This coal is soft and weathered.

(221) *About ½ mile South of the Huntsville Road and near the Summit of a Hill in the S. E. ¼ of N. W. ¼ of S. 29, T. 11, R. 2 E.*

Roof; clay.
COAL, 14 in.
Clay; floor.

This coal is soft and is mixed with clay.

(222) *About 300 feet East of Chamber's Residence, on the Side of the Gadsden Road in the S. W. ¼ of S. E. ¼ of S. 18, T. 11, R. 2 E.*

Roof; shale.
COAL, 2½ in.
Clay; floor.

(223) *About 500 feet East of Mr. C. Whitworth's Residence, on the Blountsville and Gadsden Road in the N. W. ¼ of S. 16, T. 11, R. 2 E.*

Roof; sandstone.
COAL. 3⅛ in.
Clay; floor.

This coal is hard and bright.

(224) *About 200 feet South-esst of Mr. J. A. Honey's Residence, and 20 feet East of a Country Road in the S. E. ¼ of S. W. ¼ of S. 16, T. 11, R. 2 E.*

Roof; shale.
COAL, 3 in.
Shale, bituminous, 3⅛ in.
Slate, 5 in.
COAL, 3⅛ in.
Clay, 2½ in.
COAL, 2 in.
Slate; floor.

(225) *North-west of Kerr's House about 500 feet, in the N. W. ¼ of S. E. ¼ of S. 20, T. 11, R. 2 E.*

Roof; clay.
COAL, 5⅛ in.
Clay, 1 in.
COAL, 10 in.
Clay; floor.

This coal is badly weathered.

(226) *Near Summit of the Hill about ¼ mile North-west of Parson Hames' Residence, or in the N. E. ¼ of S. W. ¼ of S. 21, T. 11, R. 2 E.*

Roof; arenaceous shale.
COAL, 1 in.
Clay, ½ in.
COAL, 6 in.
COAL; *clay*, 3 in.
COAL, 8 in.
Clay, floor.

(227) *On the Side of the Hill 150 feet South-east of the Country Road in the N. W. ¼ of N. W. ¼ of S. 15, T. 11, R. 2 E.*

Roof; clay.
COAL, 5½ in.
Clay; floor.

(228) *About 20 feet South of the Warrior River and 30 feet East of Trail to River from Chambers' House, or in the N. W. ¼ of N. E. ¼ of S. 18, T. 11, R. 2 E.*

Roof; hard, blue slate.
COAL, 5 in.
Slate, 1½ in.
COAL, 4 in.
Slate; 2 in.
COAL, 10 in.
Slate; hard, blue.

This pit is at low water level; the coal is hard and bright, and has in it iron pyrites.

(229) *South-west of Mr. W. I. Pruett's Residence about 600 feet, or in the S. E. ¼ of S. E. ¼ of S. 17, T. 11, R. 2 E.*

Roof; soft sandstone.
COAL, 4 in.
COAL, *clay*, 2 in.
COAL, 3 in.
Clay, 2½ in.
COAL, 5 in.
Fire clay; floor.

This coal is weathered and dirty.

(230) *About 200 feet East of W. I. Pruett's Residence, in a Gully in the N. E. ¼ of S. W. ¼ of S. 16, T. 11, R. 2 E.*

Roof; shaly clay.
COAL, 5 in.
Clay, 2 in.
COAL, 6 in.
Clay; floor.

(231) *On Top of Ridge ⅛ mile South of Pruett's House, or in the N. E. ¼ of S. W. ¼ of S. 16, T. 11, R. 2 E.*

Roof; clay.
COAL, *clay*, 18 in.
COAL, 10 in.
Fire Clay.

(232) *On Side of Branch ¼ mile West of Parson Jim Murphy's Residence, or in the S. W. ¼ of S. E. ¼ of S. 5, T. 12, R. 2 E.*

Roof; shaly clay.
COAL, 6 in.
COAL, *clay*, 7 in.
COAL, 3 in.
Slate, 60 in.
COAL, 23 in.
Black slate; floor.

(233) *About ½ mile from the Public Road on Coal Branch (West Berry Mountain) in the N. E. ¼ of S. W. ¼ of S. 36, T. 11, R. 1 E.*

Roof; slate.
COAL, 39 in.
Slate; floor.

This seam or pit, on being driven in some 50 feet farther, gave the following section:

Roof; slate.
COAL, 18 in.

This coal is of a dull color and is curly; it has been used for a long time in the surrounding country and has a great reputation as a blacksmithing coal.

(234) *This pit is 80 feet, Barometrically above Pit (233), in the N. E. ¼ of S. W. ¼ of S. 36, T. 11, R. 1 E.*

Roof; curly shale.
COAL, 8 in.
Clay; floor.

This coal has been disturbed and is badly weathered.

(235) *About 600 feet farther up Coal Creek than Pit (233), in the N. E. ¼ of N. W. ¼ of S. 36, T. 11, R. 1 E.*

Roof; sandy shale.
COAL, 19 in.
Slate; floor.

This is the same seam as in Pit (233).

(236) *On Coal Branch, about 40 feet above Pit (234), in the N. W. ¼ of S. E. ¼ of S. 36, T. 11, R. 1 E.*

Roof; shale.
COAL, 1½ in.
Slate, 1 in.
COAL, ½ in.
Slate, 1½ in.
COAL, 5 in.
Shale; floor.

This coal is bright and glossy, and has a *face and butt structure.*

(237) *On Coal Branch, about ¼ mile above Pit (236), in the S. E. ¼ of S. 36, T. 11, R. 1 E.*

Roof; curly shale.
COAL, 13 in.
BLACK BAND, 3½ in.
Shale; floor.

(238) *On Branch ¼ mile from its mouth or Little Warrior River, or in the S. W. ¼ of S. E. ¼ of S. 5, T. 12. R. 2 E.*

Roof; slate.
COAL, 14 in.
Slate; black, floor.

(239) *Near the Top of Berry Mountain, some 350 yards South-east of Public Road, in the S. E. ¼ of S. W. ¼ of S. 25, T. 11, R. 1 E.*

Roof; shale.
COAL, 2 in.
Clay, 5 in.
COAL, 17 in.
Fire clay; floor.

This coal is badly weathered.

(240) *Near the Top of Berry Mountain, some ¼ mile South-east of Public Road, or in the S. E ¼ of S. W. ¼ of S. 25, T. 11, R. 1 E.*

Roof; shale.
COAL, 14 in.
Shale; floor.

(241) *About 200 feet East of the Public Road, in the N. E. ¼ of S. W. ¼ of S. 25, T. 11, R. 1 E.*

Roof; shale.
COAL, 12 in.
Shale; floor.

(242) *About 600 feet North of Elijah Hendrick's House, or in the N. W. ¼ of S. E. ¼ of S. 35, T. 11, R. 1 E.*

Roof; hard, curly shale.
COAL, 19 in.
Shale; floor.

(243) *On the North Bank of Whippoorwill Creek in the N. E. ¼ of S. W. ¼ of S. 18, T. 11, R. 3 E.*

Roof; arenaceous shale.
COAL, 8 in.
Shale; floor.

(244) *About 80 feet above Pit (242), in the N. W. ¼ of S. E. ¼ of S. 35, T. 11, R. 1 E.*

Roof; shale.
COAL, 15 in.
Shale; floor.

This coal is hard and bright, and has a *face and butt structure.*

(245) *About 600 feet West of the Anderton and Blountsville Road, in the S. E. ¼ of S. 3, T. 12, R. 1 E.*

Roof; shale.
COAL, 16 in.
Shale; floor.

This coal is dull and curly, and is evidently of the same seam as pit (233).

(246) *About 900 feet West of Anderton and Brooksville Road and 300 feet West of Pit* (245).

Roof; shale.
COAL, 17½ in.
Slate; floor.

Gen. A. M. Gibson, in 1888, made the following report on that portion of the Raccoon Mountain Coal Measures that lies between the Locust Fork of the Black Warrior River and its principal tributary, the Calvert Prong. The elevated country between these two streams is called *Berry Mountain.* See *Section* 2.

THE BERRY MOUNTAIN COAL MEASURES.—Nearly west of where the *Calvert Prong* of the *Little Warrior* cuts the N. W. rim of Murphree's Valley lies an elevation called *Berry Mountain.* It derived its name from *Robert M. Berry,* who first settled and lived on its summit. It lies partly in four adjoining Townships in S's 11 and 12 of R. 1 E. and T's 11 and 12 of Range 2 East. These four Townships corner on top of the Mountain near its Eastern end. It lies between the *Calvert Prong* of the *Little Warrior* on the south-east, and the *Locust Fork* of the *Warrior* on the north-west. Its boundary on the east is *Jones' Creek*; and its south west end terminates in ridges between the head waters of the different branches of *Dry Creek.*

The height of *Berry Mountain* is about 325 feet above the rivers on each side. Its strata are nearly horizontal; they have a slight dip, just perceptible, to the north-west. It is not an uplift, or fold, but stands near the middle of the syn-

clinal trough, between the Sequatchee and the Murphree's Valley folds. It is merely a portion of the coal field that has withstood the denudation that has wasted away the surrounding region. It stands as a monument of the far past, when the same thickness of strata that now makes this Mountain, and probably much more, covered the whole adjacent country.

That this high point, or plateau, should have withstood the denuding influences that have swept away so much of the adjacent region, is surprising. It is not, as might be supposed, composed of rocks, or hard strata calculated to resist the abraiding forces; but it is almost wholly composed of shales and slates, that are easily denuded. Hence the little streams that rise within it have deeply eroded it on every side, and have cut down their channels almost to the base level. The top of the mountain is a level, or slightly undulating plateau, encroached upon on every side by deep gorges, with high sharp-backed ridges, with steep sides, between them. The whole structure shows the rapid progress of denudation.

In T. 11, R. 1 E. the *Locust Fork* of the *Warrior* meanders along the base, and round the projecting points of *Berry Mountain*. It enters this township near the south side of S. 25. *Coal Branch* which heads up in the Mountain, a mile and a quarter to the south, empties into the river in the S. E. ¼ S. W. ¼ of this section.

It was named "Coal Branch" by the early settlers of the country because coal was found in it, about a mile from the river. This was probably the first coal bed discovered in the country, at least the first that is known to have been used by the smiths. The seam was thin, only about a foot thick, but of excellent quality. It is said to have been much sought after, and to have been carried far for blacksmith use.

More recently Coal Branch has become more noted, from the discovery by *Mr. Bailes* of a good seam of coal on it, about ¾ of a mile from the river. This is known as the *Bailes Seam*. The first opening on it was made about 100 yards farther up the branch. in a gorge, and the

coal was mainly obtained by stripping till the cap-rock was reached. Coal 20 to 24 inches thick is not sufficient for easy mining. The present works consist of a drift that is cut into the coal seam in the face of the bluff, about 40 feet above the level of the branch. The coal is run down a chute from the mouth of the drift. When good coal was first reached here, at the edge of the cap rock, the seam was 36 inches thick at one side of the opening and 39 at the other. About 20 feet farther in, the seam was only 18 inches thick. It then gradually increased in thickness and at the farther end is now 24 inches thick. This seems to be about the average thickness of the seam, as observed at many other places. The greater thickness of the seam at the mouth of the drift was caused by what miners call a squeeze, produced here by a fracture in the cap-rock, about 20 feet from the entrance, and greater pressure brought on the seam at that point, which forced the body of the coal towards the outer edge. Over this seam is a hard brownish gray sand rock from five to ten feet thick; in some places it is flaggy but it is generally solid. Below this is a bouldery slate, in concretionary forms; these concretions are large, generally from 2 to 4 feet in diameter. This form of slate is about 4 feet thick; then one to two feet of hard blue arenaceous slate next to and immediately over the coal. The under clay is firm and hard and soon passes into hard slate. The following section was obtained here:

Arenaceous shales and slates, 60 ft.
Hard brownish grey sand rock, 5 to 10 ft.
Blue arenaceous bouldery slate, 4 ft.
Blue arenaceous solid slate, 1 to 2 ft.
Coal, solid, 2 ft.
Clay and slates, of various colors, to level of the river, 90 to 100 ft.

The coal of this seam is peculiar and differs much from any other as yet seen. It is solid and has no describable structure or cleavage planes. It easily crumbles, yet it is hard and firm. Its color is a dull brownish black; it has no luster and looks oily. The coal dust, of which there is much, adheres to the coal, and giving it a dirty appearance. It has

a good reputation as a free burning shop coal and has but little sulphur in it. Its appearance indicates that it is a very free burning grate coal, a good steam coal, and probably an excellent gas coal; but deficient in coking qualities.

From 75 to 80 feet above the Bailes Seam, was found the next bed. It had been cut into only a few feet. The coal was only 8 inches thick, but was evidently thickening. The coal is cubical—covered by arenaceous shales and clay. This seam was also seen in the old workings on the west fork of Coal branch. The coal here is about one foot thick; in some places it is a little thicker. This is the seam that was first discovered, and worked 60 years ago, and from which this branch got the name of "Coal Branch." It is marked No. 5 in the General Section.

Another coal seam was found 25 feet above No. 5; or 100 feet above the Bailes Seam, in the S. E. ¼ of S. 36, T. 11, R. 1 E. Its coal at the out-crop is 13 inches, but it will probably be much thicker when fairly opened. The coal is bright, clean and laminated. The openings on the coal seams throughout this region were mostly made by Messrs. Chandler and Banks for the L. & N. R. R. Co. This is the only opening that is known to have been made on this seam. This is regretted, because it gives promise of being a good seam of coal. Its out-crop is thicker and of better quality than the Bailes bed. It is stated that 2½ inches of black band ore lies under this bed. The opening when seen was partly filled with water and the base of the coal could not be seen. By feeling under the water below the coal, only laminated slate, filled with fern leaves, could be found. This was probably mistaken for black band iron ore. This is No. 6 of the General Section.

Twenty feet above No. 6 the out-crop of another seam of coal was seen but not opened. It is probably a thin seam. These last three seams are embraced in 60 to 80 feet of vertical stata.

On the West Fork of Coal Branch, in this same section, 36, the same series of coal seams and out-crops were seen. No digging had been done there, except the old digging on bed

No. 5 now filled up. The out-crop of bed No. 6 was here very plainly seen in the abraded bluff. It is apparently only 15 to 20 feet above No. 5. The out-crop here showed from 13 to 15 inches of coal. This seam is well worth prospecting for. It will certainly furnish good coal, and is probably thick enough to be easily mined. The out-crop of bed No. 7—20 feet above No. 6—was here also plainly seen.

Above No. 7, between it and the top of the mountain, fossil coal plants were found in the rocks, and there are other evidence of the existence of another coal seam, but its position was not found to a certainty, and so it is unmarked in the General Section.

On the top of the mountain some patches of coal smut were seen, showing the former existence of a coal bed, abraded and decomposed, and all except the vestiges, now washed away.

For greater convenience of description, and to give a clearer knowledge of thickness of strata, and the relations of the different seams of coal, the following *General Section* of this field is given in descending order:

GENERAL SECTION OF BERRY MOUNTAIN COAL MEASURES.

Slates, generally hard, *arenaceous*, some sand rock, shales hard (probably a thin seam of coal exists in this group), ferruginous clays at top of the mountain, with some soft shale, 90 ft. to 100 ft.

(7) COAL, thin seam, thickness unknown.
Shale, hard, curly, 15 to 20 ft.

(6) COAL, good, 1 ft. 1 in. to 1 ft. 3 in.
Slates and hard shales, 20 to 25 ft.

(5) COAL, old bed on *Coal Branch*, 1 ft. to 1 ft. 2 in.
Slates, some hard sand rock and shales, mainly arenaceous, 75 to 80 ft.

(4) COAL, *Bailes Seam; Hendricks'*, *Jones'*, *Moses'* bed, etc., 1 ft. 6 in. to 3 feet.
Slates, mainly *argillaceous*, colors various, brown, dark gray and light blue, 90 to 100 ft.
Flaggy sandstones and hard slates, 25 to 30 ft.

(3) COAL, in river at J. A. Murphree's, Dan Murphree's, etc., 1 ft. 9 in. to 3 ft.

Sandrock, heavy bedded, running into thin flaggy rock, a good building stone, 90 to 100 ft.

(2) COAL, good, 1 ft. to 1 ft. 6 in.

Sandstones, hard, flaggy, passing into hard gnarly shales, 100 to 120 ft.

(1) COAL, seam No. 1, variable quality, 1 ft. to 1 ft. 3 in.

Sandstones, soft and friable, and flaggy and hard, hard shales, ferruginous shales, and some carbonite of iron, 150 to 200 ft.

Second Conglomerate; pebbles abundant in places, irregular in structure, base generally hard and pebbly, upper part soft friable sandstone, with few pebbles, color from light gray to brown, 50 to 60 feet.

Sandrock, thin and flaggy; *shales* and *clay*, 25 to 30 ft.

LOWER CONGLOMERATE; *millstone grit*—hard massive rock, pebbles generally small, pebbles in patches and bands, more in lower than in upper part; generally a light gray, coarse grained rock, 50 to 60 feet.

Ferruginous clay, some *limonite*, and some *carbonite of iron ores; shales*, and thin sandrock, *blue slates*, and in places a thin stratum of coal, 30 to 40 ft.

CARBONIFEROUS LIMESTONE below base of Coal Measures.

DETAILS.

In a detailed description of this region, a clear conception of it can be obtained by beginning at its lowest measures on the Murphree Valley side, thence crossing the strata towards the North-west till the highest part of the mountain is reached.

Almost everywhere along the North-west side of Murphree's Valley, the base of the coal measures is visible. In a few places, where the Carboniferous Limestone has not been sufficiently elevated, or the debris from the uplifted edge of the valley has slidden down over the limestone, the base of the coal measures cannot be seen; but these are exceptional cases, and are not sufficiently numerous or extensive, to raise any doubt of the structure which can be clearly made out at a great number of places where it is fully exposed. The coal measures here rest directly on the top of the limestone; without any calcareous shales or impure shaly limestone to mark the transition from one formation to the other. The change is sudden and abrupt from lime-

stone to ferruginous clay which gradually passes up into a ferruginous arenaceous shale. The color of both clay and shale varies at different places. They both generally contain more or less iron ore, mainly limonite. This ore, however, is seldom, if ever, in sufficient quantity to be of economic value.

Above the ferruginous shale, come thin bedded sand rocks and beds of clay, sometimes succeeded by slates. At a few places, blue to black slates, have been seen at this horizon, and in one of these places a little seam of coal, about 3 inches thick, in detached spots, was seen. *The sub-conglomerate coals do not underly* this portion of the coal field.

The whole thickness of the *sub-conglomerate* measures, as shown along the whole South-eastern face of this field, is only from 30 to 40 feet. This is considered to be a full average. In no place have they been found to exceed 50 feet, while in places they show only about 20 in thickness. The great difference between these measures and the BLOUNT MOUNTAIN measures in *this* and *other particulars* will be shown hereafter.

The *Lower Conglomerate* here presents no special features. It presents the same massiveness and general distribution of pebbles wherever seen. The *Second Conglomerate* is less pebbly in the upper than in the lower part, and has rather the character of a coarse grained friable sandstone. In the lower and middle parts, in spots and bands, there are many pebbles, generally small and firmly cemented together.

The small amount of strata between the First and Second Conglomerates, and the total absence there of any coal seams, is very unusual. In this field, these *two conglomerates* might and ordinarily would be taken and considered as *one*. It was only after discovering that there was no other conglomerate in this coal field, that it was observed that the two were nearly united. The usual thickness of the flaggy rocks and other strata between them, which contain no pebbles, is about thirty feet. On the North-western side of this field, at the edge of the Sequatchee, or Blounts-

ville valley fold, the *upper* or Second Conglomerate is much harder and more massive than the *Lower*. The Lower Conglomerate has here lost its distinctive *mill-stone grit* quality, and has become a soft, often reddish colored, coarse friable pebbly sand-rock. It is hence the *Second* or *Upper Conglomerate* which in that region bears the name of "*mill-stone grit.*"

Above these two conglomerates there are from 150 to 200 feet of rocky strata to a thin seam of coal. This seam, is only about a foot thick, probably 18 inches would be its maximum thickness. So far as seen it is of inferior quality. Above this seam there are hard rocky strata, generally thin bedded and flaggy, and some hard shale, for 100 to 125 feet, making in all from 450 to 500 feet at the base of the measures that are nearly destitute of coal.

On the Whited Mill branch, about ¼ of a mile below where it cuts the rim of the valley, in S. 24, T. 12, R. 1 E., there is the following approximate section of the lowest bed in this field, or of No. 1 of the *General Section:*

SECTION IN S. 24, T. 12, R. 1 E.

Flaggy sand rock, and hard shales, making the side of the mountain		75 feet.
Hard slate over coal seam		2 "
COAL	8 inches.	3 ft. 1 in.
Clay	2 feet.	
COAL	5 inches.	
Hard slate below water level; unknown thickness.		
Hard sand rock; generally thin bedded; sometimes massive; down to conglomorate; 175 ft. and over.		

This coal seam was opened here in the bed of the branch a few years ago and some coal taken out. The coal is said to be of good quality, but its position is unfavorable for mining and the thickness of the coal would not compensate for the labor in taking it out. It is now covered by water, and the excavation nearly filled up.

This same seam was found several miles farther down the mountain to the south-west, on a little stream called Big Branch, in S. 5, T. 13, R. 1 E. The coal here showed about the same thickness, and, so far as cut into, it is of poor quality.

The coal seam No. 2 of the *General Section* is exposed at several places in the smaller streams which empty into the Calvert Fork of the Little Warrior on the South-east side. About ¼ of a mile above the mouth of *Mill Creek*, and near the line between S. 33 and 34, T. 12, R. 1 E, at the side of the creek, this seam has been cut and some coal taken out. The coal here is hard and glossy with a peculiar *conchoidal fracture*. Its appearance would indicate that it had been subjected to a sliding pressure which deranged its structure and forced it into feather edges with a conchoidal cleavage. The coal is sulphury and rather unsuitable for blacksmith work, though it is free burning coal. It would answer very well for burning in grates and for domestic use. It is probable that the peculiar structure of the coal here is only local; it has not been seen anywhere else. The thickness of the bed is from twelve to fifteen inches.

In the bed of the *Calvert Fork*, half a mile or three quarters above the mouth of *Mill Creek*, a small seam of coal is exposed. It is supposed to be the same seam (No. 2). Its thickness here is about one foot. The coal is cubical and its quality fair to good.

Near the eastern side of this T., and probably in S. 13, in a ravine coming down from the mountain, there is some showing of coal; it is not opened and is supposed to be also an out-crop of seam No 2. This is near to and south of Dan Murphree's.

Near James A. Murphree's, in the N. W. ¼ of N. E. ¼ of S. 8, T. 12, R. 1 E., on a branch flowing into the Calvert Fork from the North, is a fair showing of coal. This is seam No. 3 of the General Section. The coal had been cut at the very edge of the branch, where it is dipping from 3″ to 5° to N. W. This drip carries it below water level from the start, and so it is unfavorable for working. The seam here is 23 inches thick and has a good appearance. It has not been as yet tested. On the opposite or eastern side of the branch, an opening had been made on the same seam. There it is near the surface and has no roof, and the coal is almost wholly decomposed. The thickness of the decom-

posed seam is three feet. A decomposed seam that is not under much pressure will occupy a thicker space than the same quantity of coal when solid and compact; yet, some allowance for wastage must always be made in the case of decomposed coal. It may be safely inferred that the wastage here has been considerable, and that the solid bed of coal, when fully exposed, will approximate the thickness of the decomposed seam.

Some out-croppings of this seam were also seen farther to the south-west and close to the Calvert Fork. If this seam could be opened here or at some other place above water level, in an excavation at a right angle to the dip, so as to be self-draining, it could be satisfactorily tested. This seam presents here as good a prospect as any other seam in the field, and it is very desirable that its thickness and quality should be fully tested.

In several places to the South-west, or farther down the Calvert Fork, coal is known to occur in deep holes of the river; they are probably the same seam. Also in Section 7 of the same township, on or near the lands of Daniel Murphree, on a high point south of the river where the strata seemed to be abnormally elevated, some coal has been mined in former years. The opening here was totally filled up and the thickness of the seam could not be ascertained. From the overlying strata here, of which there is a good exposure, this coal is judged to be the same as the Jas. Murphree's bed, or Seam No. 3.

In the same geological horizon, on the lands of Obea Ellis in the N. E. ¼ of N. E. ¼ of S. 22, T. 12, R. 1 E., the same bed was also found. It was only partially exposed here in a deep spring, in a hollow 10 to 15 feet above the level of the river. Its position was found to be approximately 100 feet *below the Bailes Seam*, or No. 4 of the *General Section*. It has already been stated that there is no coal seam lying between the *Bailes Bed* and the water level of the Locust Fork of the Warrior River, and that from 90 to 100 feet of slate, or slaty strata, are there exposed. The Bailes Seam had been cut and identified at the place now

under consideration, in Section 15, a little over half a mile to the north and 100 feet above the coal in S. 22, at Mr. Ellis.' It is therefore evident that Seam No. 3 is the first one below No. 4 and that the space between them is about 100 feet. The measurements made on both sides of the mountain agree well, and very satisfactorily establish the relation of these seams to each other.

Seam No. 4 of the General Section is known as the *Bailes Seam.* So far as development has yet gone, it is the most important seam in this region. It is a very persistent seam of nearly uniform thickness and quality, so far as yet exposed. The openings made on it by David Bailes, in S. 36, T. 11, R. 1 E., have been already described and need not be repeated.

In the N. W ¼ of the S. E. ¼ of S. 35, in the same Township, on the lands of E. D. Hendricks, another opening was seen on this seam. It was not cut here beneath the cap rock, and the full thickness of the seam was probably not reached. The coal was 18 inches thick; it was cleaner and brighter than at the Bailes openings. It is here the same level, and its cap-rock and roofing slates are identical with the Bailes opening.

Below the Hendrick's opening was a good exposure of the underlying slates. These slates were traced down the bed of the stream for 90 feet below the coal seam. No fossil coal plants were found, nor any evidence of an underlying coal bed. At the lowest exposures reached, a few marine shells were found and also some fragments of plants apparently also marine. Below this, the surface was wholly covered with silt, and, even in the bed of the stream, the slates were not exposed.

Another opening on this seam was seen in S. 30, T. 11, R. 2 E., on the Moses place. The digging here is in the face of a bluff, at a very good place to open the seam, about 10 feet above the bed of a little branch. The cap rock is well exposed, but the coal had not been cut into far enough to reach it. No good or solid coal had therefore been reached in this opening. The thickness of the soft, loose,

and partly decomposed coal is 3 feet. How much of this is due to swelling and slacking by decomposition, or to crushing out from under the edge of the cap rock, cannot yet be known. It seems to present a condition similar to what was found at the Bailes opening, which has from 36 to 39 inches of coal at the edge of the cap rock and only 18 inches 15 to 20 feet farther in. Judging from the general thickness of this seam, as observed at different places, it is hardly probable that it will maintain its present apparent thickness. This opening ought to be driven in farther and the character of the bed here revealed.

The most interesting thing found here was a number of joints, or sections, of a *Stem of Sigillaria* 8 inches in diameter. It stood among the loose shales above the coal. The leaves and marking of the leaves of *Sigillaria* are exceedingly common in the rocks above these coal seams, but the petrified stems are not often found.

This seam was also seen at out-crop on the north side of the mountain about half a mile north of the Moses opening. It is also opened, and some coal has been taken out, on the lands of Mr. Jones, a half a mile or so farther east.

Near the South side of S. 10, T. 12, R. 1 E., on the South side of Berry Mountain, on the lands of Marion Self, this seam had been opened. The cut was not driven in far enough to reach the cap rock, and there was nothing but drift above the coal. The cap rock was plainly to be seen about 20 feet farther up the branch. It is identical with the rock seen capping this seam at all the other openings. The same peculiar blue to reddish colored bouldery slate occurs in the lower part. The upper part is an imperfectly laminated arenaceous hard shale, changing gradually into a hard compact reddish colored sand rock. This cutting was also at the same level as the Bailes bed, and other openings already mentioned. No doubt of its identity was therefore entertained. The strata here showed a very slight dip, just perceptible to the N. W. The coal here has almost the same appearance and characteristics as the *Bailes bed* on Coal

Branch, only it is less hard and firm. It is here merely the out-crop. The seam here is 2 feet thick, and, when fully opened, will yield coal similar to, if not identical with, the Bailes openings.

In the S. W. ¼ of the S. E. ¼ of S. 15, in the same T., another opening was seen in this seam. The coal here is less firm than in S. 10. The only roof here is shale. The seam at this place is near the surface, and good coal could not be expected in the place where the opening was made. The position of the seam at this opening is 20 feet higher than at the opening in S. 10; it thus shows that the seam here has a North-west dip of about 20 feet to the mile.

In the N. E. ¼ of the S. E. ¼ of S. 16, in the same T., on the lands of Mr. Al. Blackwood, the same seam had been partially opened. The roof here is a reddish curly shale; the firm coal has not yet been reached. This and the two or three last mentioned openings had been made by prospectors about a year ago. The object seems to have been to find and trace certain seams, rather than to test their qualities. The dipping was stopped as soon as the thickness of the bed was ascertained. No work has been done on any of these last openings since they were made, and in some cases the excavations are partly filled up. The bottom of the bed in this opening could not be seen. The thickness of the seam here is said to be 25 inches. The opening is on the South side of a high hill, and, had the drift been cut in far enough, doubtless good coal would have been found.

All of the openings on this seam show that it underlies the whole of Berry Mountain, and may be mined on all sides of the mountain, and on all the spurs of it, which extend down between the different forks of Dry Creek, and between South Dry Creek and the Calvert Fork of Little Warrior. The quality of its coal, so far as can be judged from the out-crops is very uniform. The seam will doubtless yield, throughout, a good *grate coal* and probably an excellent *steam and gas coal.* It may do reasonably well for blacksmith work but its coking qualities are seriously doubted. It is, so far as yet known, the best coal bed in the Berry

Mountain region; and as it is the lowest seam above water level, in that portion of the country, it is of course the most extensive, and the most available for easy approach and mining.

Coal bed No. (5) of the General Section was first seen on the West side of Coal Branch in Section 16, T. 11, R. 1 E. A small opening had been made on the seam. The coal here is thin, but increasing in thickness. It is roofed over with hard curly shale. No cap rock was reached. The coal is cubical and is of good quality, but it is only 8 inches thick. Its position by anæroid measurement is 75 to 80 feet above the *Bailes Seam.*

On the West fork of *Coal Branch*, at the same level, it was seen at the "*old diggins*" in the bed of the branch. It is said to have been worked many years ago. The seam is said to be 12 to 14 inches thick and the coal excellent, free from sulphur, and suitable for the finest blacksmith work. Its out-crop was also seen on the East fork of Coal Branch in the same section.

Seam No. (6) was first seen on the East fork of Coal Branch in S. 36, T. 11, R. 1 E. A small cut had been made into it on the side of the bluff just above water level. It was only dug into a few feet. The coal cut out was of good quality; it was hard, bright and cubical. It was 13 inches thick. This was not a fair test of the seam; it is doubtless much thicker farther in. Another out-crop of this seam was seen in the bank of the West fork of Coal Branch. The natural exposure there measured 15 inches in thickness. No cap rock was seen at either of these out-croppings of No. 6. Its position is 20 to 25 feet above seam No. (5) and 100 feet above the *Bailes Seam.* No. (4).

On the south side of Berry Mountain, in S. 11, T. 12, R. 1 E., a thick bed of coal smut and soft coal was seen in the road. It was judged to be the out-crop of this seam. It was apparently too thick for either the little seam above or below this one, and it was much above the level of the Bailes bed. No opening had been made here, nor is any other opening or exposure of this bed known of on the moun-

tain. This bed is one of much promise. It may not prove to be thick; probably not thicker than the Bailes Seam, and yet it is thicker at the out-crop than that seam usually is, and the quality of its coal, at the surface, is much better.

Coal Seam No. (7) lying 15 to 20 feet above No. (6) is a thin seam. Only one small and imperfect opening was seen on it. This opening was just above No. 6 on the East Fork of Coal Branch. Only coal smut was reached, and the thickness of the seam could not be determined. It seemed to be less thick and less promising than the bed immediately below it. Its out-crop was also seen at the same horizon on the West Fork of this branch.

The three seams, Nos. 5, 6 and 7, are very close together. They are all included in 35 to 45 feet of vertical strata. In this respect, and also in thickness, they resemble the group of seams numbered "(6), (7) and (8)" in Jefferson county, as given by PROF. MCCALLEY in his "*General Section* of the Warrior Coal Field." See Biennial Report for 1886, page 276. They may be the same beds. Perfect similarity and identity could not be expected in either coal seams or other strata at places widely separated, even in the same Coal Field. It also now seems more than probable that the great Warrior Coal Feld in its origin had natural divisions in it and consisted of a *series of coal basins*, rather than a homogeneous field. This will be noticed more hereafter, under the head of OBSERVATIONS.

Most of the work of prospecting and of opening of coal seams in this region has been done by MESSRS. CHANDLER and BANKS, for the L. & N. R. R. Co. They rarely if ever penetrated far enough, to show a fair sample of the coal. They supposed that the *Bailes Seam* is the well known *Black Creek Seam* of Jefferson county and persistently hunted for the *Jefferson Seam*, 30 to 50 feet above it. In this, of course they were disappointed. The *Bailes Seam* cannot be identical with the *Black Creek*. There is not a single point approximating identity in their structure or surroundings. The horizon of the *Black Creek* is from 800 to 1,000 feet *above the Bailes Seam*. The Bailes

Seam is within 225 feet of the top of the measures, hence the *Black Creek* and all overlying seams *do not exist* in this region. No evidence has yet been seen here even of the *Warrior Seam*, and it may be safely stated that it does not exist in the Berry Mountain region. All of the 7 or 8 seams yet found in this portion of the field belong *near the base of the measures*, and have their *representatives*, if not their equivalents, in the seams below No. (9) of the *General Section* of the Warrior Coal Field in Jefferson county as shown in PROF. MCCALLEY'S *Report*.

It is possible that the measures of Berry Mountain may be sunk by a fault along its South-east side and so have a greater thickness of coal measures than herein shown. The evidence of the existence of such a fault is rather suggestive than conclusive. Along the course of the Little Warrior is the dividing line between the hard sand rocks highly inclined on its South-east side and the nearly horizontal slates and shales of Berry Mountain, on its North-west side. The North-west dip of the hard sand rock strata terminates here often very abruptly and does not show a gradually decreasing dip, as might be expected in synclinals where there is no fracture. Then the sandy soil and the shaly soil formed by the decomposed rocks on the opposite sides come together at a *well defined line*, about where the dip of the Sand Mountain side terminates; and often there is a distinct depression along the line of junction. Again, at one point it was observed that the sand rock to the South-east of this junction line of soils was about 10 feet higher than the slates on the North-west side. This could not clearly be accounted for except on the hypothesis of a fault; and, taken in connection with the other evidence, seems sufficient to render the existence of a fault probable.

If a fault exists here, it is believed that the down-throw of the Berry Mountain side is *not very great* and probably will not materially change the estimate of the whole thickness of its coal measures.

At two places on the South-east side of the Calvert Fork, the Berry Mountain slates were seen capping the Sand

Mountain strata. Their relation was clearly shown at these points and it is certain that, if any down-throw exists here, it has not been great enough to engulf any coal seam or to obscure their relations.

OBSERVATIONS.

The region in which Berry Mountain is situated shows the results of great denudation. The mountain itself is a mere remnant of a once extensive plateau. Standing on its top the denuded area can be clearly seen on both sides and to extend down the synclinal trough far to the South-west. Measured by the height of this mountain, all this denuded region has evidently lost over *300 feet* of its strata. How much more than that it is now impossible to estimate. It is very evident, however, that the top of BERRY MOUNTAIN was not the *original top* of the coal measures, for remnants of a decomposed coal bed are found there. The drainage of part of the Sequatchie or Blountsville Valley fold, and of all the region South of the *Raccoon and Blount Mountains*, and west of the *Eastern rim of Blount Mountain* to its Southern end, flows into and down this synclinal trough. The confluent waters from this extensive watershed have washed and eroded the whole region between the Murphree's Valley and Sequatchie folds. The base level of its streams is now from 100 to 200 feet below the floor of the valley folds on each side, and the height of the country generally is not great above the streams. Berry Mountain, Foust Mountain, and a few prominent ridges only remain as monuments of the past and relicts of the wreck produced by erosion. Judged by the thickness of the measures on the opposite side of Murphree's Valley, and under the assumption that the coal field was originally the same on both sides, it would seem that these had lost over 1000 feet. We find, however, very great differences in the structure and in the strata of these two sections. A few of the most prominent of these differences will be briefly considered.

In this field, as has been stated, there is very little of coal strata below the *Lower Conglomerate*, only 30 to 50 feet. This thin streak of measures carries no coal on the North-western side of the field, and only the merest fragment of one seam, seen only at one point, on its South-eastern side,* while in the Blount Mountain field the strata below the *Lower Conglomerate* are fully *600 feet thick*, and have *four seams of coal.*

The strata also of these *sub conglomerate* measures are very different in these two fields. In this one they are almost wholly made up of ferruginous shales and reddish or bluish clays. In the other, they are largely composed of *Slates* and hard grey arenaceous shales or hard sandrock. These differences are shown on the South-east faces of these fields, which are only 10 to 12 miles apart. The same great thickness of *sub-conglomerate measures* is shown still farther to the South-east, in *Chandler's Mountain*, and extends along the South-east face of the Blount Mountain for more than 40 miles. It is therefore hardly probable that they diminished to a farther edge in so short a distance to the North-west. It is more probable that the Jones' Valley, and Murphree's Valley uplifts, are on a line that *marked a division between the Cahaba and Blount Mountain* coal fields, on one side, and the *Warrior and Cumberland Mountain coal field*, on the other.

Again, in this field, there is no coal between the *Lower* and *Second Conglomerates*, and but very little, so far as is known, in the Warrior field, while in the Blount Mountain there are *two thick seams*, and over 300 feet of strata. This is a difference that is inexplicable, if the fields are regarded as identical.

Again, in this field, the upper portion, over 300 feet thick, is almost wholly composed of *slates* and *argillaceous shales;* in the other there is no corresponding body of strata at a similar horizon. This might be regarded as a local and

*The Cliff Seam, just under the *Millstone Grit*, has been seen by me in several places on the North-west face of the mountain, next to the Blountsville Valley. H. McC.

accidental difference were it not so extensive, but the same great body of slates are found in all the ridges and high points for many miles. They make the country between the Locust Fork and the Calvert Fork at least as far down as the junction of the Little Warrior. In the Blount Mountain field there is a considerable body of slates, but they lie over 100 feet *above* the *Third Conglomerate*, and include the 14th seam of coal from the base of that field. Hence these and the Berry Mountain slates *cannot be identical.* They are a portion of coal measures that now, at least, are wholly wanting in this region.

In addition to these great differences in the strata and general structure of these two contiguous coal areas, it may be added that their *coal seams* are *wholly unlike.* There is not, so far as yet seen, a single seam that is common to both fields. None of them are identical. They differ in quality and thickness of coal, and in their relation to strata or position in the measures. This will be readily seen by comparing together the *detailed sections* of the two fields. Their differences will be found too great for any semblance of identity.

All these facts go very strongly to prove that the Berry Mountain coal field and the Blount Mountain field, though separated by only a few miles of valley, yet they belonged originally to two different coal basins. The former showing a similarity to the base measures of the Warrior field, the latter having no seam yet shown to be even similar in character or surroundings to any one of the Warrior seams.

Whether there is a close relationship, or identity of structure, between the Blount Mountain field, and the *Cahaba* or *Coosa fields*, cannot yet be determined.*

The advantages for mining the coal of the Berry Mountain field are excellent. All the strata in its central parts, including the mountain, are nearly or quite horizontal. All

*The Raccoon Mountain coal measures are as different in localities of its own, connected by unbroken strata, as they are from those of Blount Mountain, and so the above argument does not prove that the coal measures of Raccoon and Blount Mountains were necessarily originally of different coal basins. H. McC.

mines and openings and drifts on its coal seams can therefore be made self-draining. All of its coal can be rolled to the dump on horizontal tramways. The expense of mining will therefore be much less than is usual in coal mines. Here the many gorges and deep hollows cut into the mountain will enable the seams to be opened at any desired point, and at a great many different points, on all sides of the mountain. Mining may therefore be done here by all those who own the lands that contain the coal seams. It may be done at their convenience, or when not otherwise employed on their farms. Mines and drifts properly constructed will remain unobstructed and in working order for years. Hence mining operations may stop without detriment to the works and be resumed again at pleasure. This is an advantage that few coal mining regions possess.

The same advantages may also be attained on the South-east side of the Calvert Fork, if any seams be there found thick enough for tunneling. Advantage being taken of the dip of the strata secures self-drainage of the mine and easy out-put of the coal.

All but one of the known seams of coal in this field are above water level, wholly or in part. All that portion of the lower seams which lies South-east of the Calvert Fork, and the four upper seams of Berry Mountain, have the above advantages. Only in the upper seam of the lower or Sand Mountain series (the out-crop of which is near or in the bed of the river) will there be found any trouble with water in mining.

This coal field has also an advantageous position for marketing its coal. It lies but a few miles from Murphree's Valley. Nearly opposite to it is the gap in the rim of the valley, through which the Calvert Fork runs, from the valley to the base of the mountain. Through this gap a favorable outlet for its coal, to a promising future market, already exists. A railroad could be built, with an easy grade, through this gap. The length of the branch road here necessary to connect with the Birmingham and Huntsville railroad would be about three miles. The future of

this coal field, therefore, depends wholly on its *capacity* and the *quality* of its coal, both of which can only be shown by more extensive development.

C. THE SAND MOUNTAIN COAL MEASURES.—The portion of these measures that is within this county is of a very irregular shape. The county line is the Mulberry Fork of the Black Warrior River down to nearly opposite Hanceville, when it leaves the river and runs in a general W S W. course, by broken lines, to R. 5 W., in T. 12, thence south 15 miles to T. 15, and thence in an E N E. course, by broken lines, to the L. & N. R. R., south-west of the end of Brown's Valley, where the Coal Measures of Sand and Raccoon Mountains blend into each other. The area included between this broken line and Brown's Valley is the portion of Sand Mountain that is within Blount county; it is all coal measures and embraces some 130 sq. miles. The south-east edge of this area was elevated by the anticlinal fold of Brown's Valley, and so the dip is away from this valley or to the north-west. This dip along the crest of the mountain varies from 45° to N. W. to 85° to S. E. It rapidly flattens, however, and there is along the county line the normal dip of 3° to 4° to the S S W. of the Warrior Coal Field. (See section 2.) The anticlinal fold of Brown's Valley continues unbroken, in the coal measures along the county line, to the south-west of the end of the valley to the south-west corner of this county. As the general dip to the south-west is greater than the inclination of the surface, the measures, of course, thicken in that direction and are thickest in the south-west corner of the county where they will measure over 1,200 feet in thickness. These thickest measures include 6 to 7 seams of coal. Only the two uppermost seams however are of workable thickness and the uppermost one is too near the surface or top of the highest points in the south-west corner of the county to be of any commercial value. The remaining seams are less than a foot in thickness.

DETAILS.

Near the county line, though in Cullman county, in S. 14, T. 12, R. 4 W., is the *Aycock coal bed.* The coal is firm and good, but it is only 14 inches thick. It has a good cover of hard massive sandstone that forms a bluff over the coal out-crop. This bluff has been undermined for some 20 feet back from its face, by the neighborhood blacksmiths in digging out the coal, and still it stands firm without any supports. The underbed to the coal is a fire clay. This coal bed is believed to be the well known *Black Creek Seam* of Jefferson county.

The *Bremen coal bed* is in S. 22, T. 12, R. 4 W. At this bed there is the following badly weathered out-crop:

SECTION AT THE BREMEN COAL BED, IN S. 22, T. 12, R. 4 W.

(6) *Soil, loose sandstones;* about 25 ft.
(5) COAL SMUT, 3 in.
(4) *Shale;* soft and blueish, 4 in.
(3) *Shale,* COAL; the shale is blue and black, and occasionally a sandstone; the *Coal* is in thin streaks in the shale and sandstone, 4 ft. 9 in.
(2) COAL; hard and good, 1 ft. 1 in.
(1) *Shale, Debris.*

This outcrop is also believed to be of the Black Creek Seam, though it may be of the *Jefferson Seam,* Jefferson county.

There are said to be coal exposures also in S. 21, T. 12, R. 4 W.; they are doubtless of the Black Creek and possibly also of the Jefferson Seam, the two uppermost seams. There are out-croppings of a lower thin seam in Dorsey's Creek in S's 29 and 31, T. 12, R. 4 W. The out-crops in S. 31 are said to be about 8 inches thick, though in Mr. S. J. Stewart's well, in the northern part of the section, this same seam of coal is said to be only 6 inches thick. At Mr. W. S. Leeth's two springs, in the S. E. ¼ of S. W. ¼ of S. 1, T. 13, R. 5 W., there are out-crops about one foot in

thickness of a seam of coal covered by a light yellowish sandstone that on the weathered out-crops is friable or soft and a little shaly in places. Some 50 feet under this seam of coal there appears to be another seam as seen in the road from Mr. Leeth's down to his mill, about in the S. W. ¼ of S. E. ¼ of S. 1, T. 13, R. 5 W. The upper of these seams is believed to be the *Black Creek Seam*, though it may be the Jefferson Seam.

At Mr. S. W. York's spring, in S. 5, T. 13, R. 4 W., there is an out-crop of coal that appears to be about 2 ft. thick. This seam of coal crops out also some 200 yds. down the spring branch at the crossing of the road. It is covered by a coarse orange sandstone and has an underbed of fire clay. It is the *Black Creek Seam.*

The *Clifty Coal Bed*, in S 7, T. 13. R. 4 W., has about the following section:

SECTION OF CLIFTY COAL BED, IN S. 7, T. 13, R. 4 W.

(9) *Sandstone;* massive and of an orange color, a little slabby in places, 20 ft.
(8) COAL; very hard, in patches in the sandstone, 3 in.
(7) *Sandstone;* variable in thickness, 10 in.
(6) COAL; in patches, 3 in.
(5) *Sandstone*, 9 in.
(4) COAL; cubical, variable, in places are impure *black-band ore*, 3 in.
(3) *Shale*, COAL; the *Coal* is variable and is in thin sheets in the shale, 3 in.
(2) COAL; very hard and good, 2 ft. 5 in.
(1) *Shale, Debris.*

From (3) to (8) inclusive of this section are very irregular and occur only in places. This coal bed is at the head of a ravine, under an overhanging crescent-shape bluff. The strata in the upper part of this bluff appear to dip about 15° to the S. W.; they are in waves from N. E. to S. W. This bed is the *Black Creek Seam*, and is about 325 feet above the Mulberry Fork of the Black Warrior River.

Near the top of the mountain in the Bremer road, soon after leaving Arkadelphia, in the S. W. ¼ of S. 16, T. 13, R.

4 W., is an out-crop of coal about 6 inches thick with a sandstone cover and a fire clay underbed. It is either the Jefferson or Black Creek Seam. In the S. W. corner of T. 13, R. 4 W. and the S. E. corner of T. 13, R. 5 W., there are several known out-crops of the Black Creek Seam. Some 70 to 75 ft. above these out-crops, when the hills are high enough, there are appearances of another seam which must be the Jefferson Seam, and some 175 ft. under the Black Creek Seam there are reported out-crops of coal in the Mulberry Fork of the Black Warrior River.

In the field some 40 feet below Mr. Jessie Stephen's house, in the N. E. ¼ of N. W. ¼ of S. 36, T. 14, R. 5 W., there is an out-crop of coal smut about 3 inches thick, with a few inches of clay just under it, and then a shaly micaceous sandstone full of plant impressions.

There is also just over this smut a few inches of clay, and then debris that may hide more coal.

In S. 20, T. 14, R. 4 W., there is said to be a good bed of coal.

In Mr. Paris' well, in the S. E. ¼ of S. 12, T. 14, R. 4 W., there is said to be a thin seam of coal. It is probably the first seam over the *Upper Conglomorate*, as this conglomerate is the surface rock about one mile to the north-east on top of the undenuded Brown's Valley anticlinal fold.

At Hanby's Mill, on the Mulberry Fork of the Black Warrior River, in the N. E. corner of S. 35, T. 13, R. 4 W., the strata dip from 8° to 20° to N. W.

In the Arkadelphia road about one mile from this mill, in the S. W. ¼ of S. 26, T. 13, R. 4 W., there is a thin out-crop of coal smut over fire clay; and in the N. E. ¼ of S. 27, T. 13, R. 4 W., there is an exposure of a coal seam about 3 inches thick. In Mr. F. A. Hewitt's field, in the banks of the river about ten feet above low water mark, in the N. E. ¼ of S. E. ¼ of S. 26, T. 13, R. 4 W., there is an out-crop of coal about 6 inches thick. Some three-fourths mile up the river, or in the S. E. ¼ of S. 23, T. 13, R. 4 W., there is said to be in the river an out-crop of coal some 2 feet thick. On top of the

mountain in the N. W. ¼ of S. 30, T. 13, R. 3 W., there is said to be a large basin or pond.

In the S. E. ¼ of S. 4, T. 14, R. 3 W., there is said to be an out-crop of coal, and in a cut on the L. & N. R. R., at the south-west end of Brown's Valley, in S. 27, T. 13, R. 3 E., there is an out-crop about 12 inches thick of the coal seam just under the *Lower Conglomerate, the Cliff Seam.*

The dip along the north-west edge of Brown's Valley varies from 45° to N. W. to 85° to S. E. The river, between Blount Springs and Garden City, is just to the north-west of this elevated rim, of principally the Lower and Upper Conglomerates.

A six inch seam of coal is said to occur in the river, in the S. E. ¼ of S. 30, T. 12, R. 2 W., and about ten feet above low water in the river in the S. W. ¼ of S. 16, T. 12, R. 2 W. This seam of coal is perhaps 35 to 40 feet above the Upper Conglomerate. At Mulberry Mill, in the S. W. corner of S. 20, T. 12, R. 2 W., are some false bedded strata in the west bank of the river. In a gap through the rim of the mountain in the N. E. ¼ of S. 10, T. 12, R. 2 W., there is a spring of very strong chalybeate water that may have its origin in a thin seam of coal. The dip in this gap is about 70° to N. W. In Mud Creek in the N. W. ¼ of S. 27, T. 11, R. 2 E., there is said to be an out-crop of coal. In the S. E. ¼ of S. 30, T. 11, R. 1 W., the Lower Conglomerate or Millstone Grit is more than perpendicular, or is bent over to the north-west until the dip on the out-crop is some 85° to S. E. Just to the north-west of Gum Spring, in the S. E. ¼ of N. W. ¼ of S. 29, T. 11, R. 1 W., there is in an old road an out-crop of coal smut about 8 inches thick over 4 to 5 feet in thickness of fire clay. This out-crop is of the first coal seam over the *Upper Conglomerate.* This same coal seam crops out in the S. W. ¼ of S. W. ¼ of S. 22, T. 11, R. 1 W., in the road to Chamblee's Mill, some 20 feet over the Upper Conglomerate. The coal smut of this out-crop is from 8 to 10 inches thick and is over a thick bed of fire clay. The dip here is about 45° to the N. W. At Chamblee's Mill, in the northern part of S. 21, T. 11, R. 1 W., there are some false-bedded

strata. On top of the mountain in S. 14, T. 11, R. 1 W., there is a pond or sink.

In a whirl pool or deep hole in the river in the southern part of S. 28, T. 9, R. 1 E., there is said to be an out-crop of a seam of coal. It is the seam just under the *Upper Conglomerate* which crops out in a bluff along the river. The dip here appears to be a few degrees down the river or to the south-west, and a little greater than the fall in the river. The mountain along here has a very perceptible basin area as seen from the south-east crest. Just to the south-east of this crest and near the top of it, or just under the Lower Conglomerate or Millstone Grit that forms the crest, there is in the S. E. ¼ of S. W. ¼ of S. 2, T. 10, R. 1 E., an out-crop of white plastic fire clay, that has been dug from open pits and worked up into jugs, jars, etc. Only the better portion of this clay, or that which is free from grit, is used. Near these diggings, there was dug by employees of the B. M. R. R. into this clay a pit of which the following is a section as given in their note book:

TEST PIT NO. 2, S. ½ of S. W. ¼ of S. 2, T. 10, R. 1 E.

Conglomerate.
Slaty clay.
COAL, 4 in.
Fire clay, 14 in.
Clay (sandy), 10 in.

The conglomerate of this pit, as has been stated, is the *Lower Conglomerate.* The dip here is about 30° to N. W.

Some three-fourths of a mile to the north-east, or about one-half mile to the north-west of Summit, there occurs the following section, as given in the report of the B. M. R. R.

Conglomerate.
Slaty clay, 12 in.
Fire clay, 51 in.

In the Blountsville road just south of Summit, the Lower Conglomerate dips about 45° to the N. W. The strata, however, here at Summit, along the south-east edge of the mountain, are in long deep waves or wrinkles from N. W. to S. E. Summit is in the trough of the greatest or most south-eastern of these waves or wrinkles, which, here at Summit, is some

350 yards broad from crest to crest, and about 125 feet deep from top of crest to bottom of trough. These waves appear to disappear rapidly to the north-west, or as you go away from the edge of the mountain or the anticlinal valley. There is here at Summit something like the following section:

SUMMIT SECTION, IN S. 36, T. 9, R. 1 E.

(14) *Shales, Sandstones;* some of the shales are hard and ferruginous and some of them are clayey or argillaceous and of a light gray color; the sandstones are shaly and slabby. These strata cap the high point one-half mile north-east of Summit, 20 ft.
(13) *Upper Conglomerate;* about 15 ft.
(12) COAL; at chalybeate spring on side of above high point and also reported to be in the gin-house well, at Summit, where it is said to be of poor quality, but about 2 ft. thick; 2 ft.
(11) *Fire clay;* in above chalybeate spring.
(10) *Shales, Clay-iron-stone;* the shales are arenaceous and have in them fossil plant impressions and streaks, from two to three inches each in thickness, of clay ironstone, 25 ft.
(9) *Lower Conglomerate;* about 25 ft.
(8) *Clay-iron-stone;* shaly on top with plant impressions, 1 ft.
(7) *Fire clay*, 4 ft.
(6) COAL, 2 in.
(5) *Fire clay*, 3 ft.
(4) *Debris*, 5 to 6 ft.
(3) *Shale, Clay iron-stone;* the clay-ironstone is in streaks in the shale, 3 ft.
(2) *Quartzite;* very hard, 10 ft.
(1) *Debris;* covering the lowest strata of the Coal Measures and the uppermost sub-carboniferous strata.

From (1) to (9) inclusive crop out along the Warrenton road just east of Summit. A pit was dug into the strata just under the Lower Conglomerates by the employees of the B. M. R. R., and the following section given by them.

Conglomerate.
Manganese Iron Ore, 5 in.
Clay and Slate, 8 in.
COAL, 2 in.
Fire clay, 4 ft.
Sandy clay, 1 ft.
Yellow slate, 6 ft.

The dip here is from 12° to 30° to the N. W.

On the Huntsville road about 2 miles north of Summit is a pond; and on Price's Creek, in S. 6, T. 9, R. 2 E., there is the following out-crop :

OUT-CROP ON PRICE'S CREEK, IN S. 6, T. 9, R. 2 E.

(5) *Shales, Sandstones.*
(4) COAL, BLACK BAND ORE; the *coal* is variable and is in places an impure *black-band* ore, 6 in.
(3) *Shales;* hard, 2 in.
(2) COAL ; very impure, cubical, 4 in.
(1) *Clay.*

11.—THE COAL MEASURES OF ST. CLAIR COUNTY.

The Coal Measures of St. Clair county are of the Warrior, Cahaba and Coosa Coal Fields and cover nearly 225 square miles.

A.—The Warrior Coal Field.—The Coal Measures of the Warrior Coal Field in St. Clair county comprise the elevated south-east border and the steep south-east side of Blount Mountain and the whole of Chandler Mountain. The north-west boundary line of the county is the divide between the waters that run into the Warrior River and those that run into the Coosa River, along the elevated south-east brow of Blount Mountain. The Coal Measures of this mountain that are in St. Clair county are therefore principally on the south-east side of the mountain, which is formed by the hard conglomerates near the base of the measures. They lie therefore between and below these conglomerates. A general section of these measures is given in the lower part, the portion below the Second or Upper Conglomerate, of the general section of the Coal Measures of Blount Mountain. See Section 2. From that section it can be seen that these measures are about 1200 ft. in thickness. They include, according to Gen. Gibson, 6 seams of coal of over 1 ft. each in thickness. The two upper seams are over 3 ft. each in thickness. That section also shows that the sub-conglomerate measures are very highly developed, that they are over 600 ft. in thickness and include four of the above seams of coal. The structure of these measures, their general dip to the north-west, is seen at the south-east end of the graphic section across Blount Mountain as given in *Section 2*.

Chandler Mountain is nothing more than a detached part of Blount Mountain. It is separated from Blount Mountain by *Greasy Cove* which is the south-west end or head of Big Wills Valley. Big Wills Valley is an anticlinal valley and the unbroken or undenuded fold of this valley is said by Gen. Gibson to extend to the south-west of the head of Greasy Cove as a prominent ridge, called Buck's Ridge, on Blount Mountain. This ridge or undenuded portion of the fold is said to to extend to the south-west of the head of Greasy Cove to the end of Blount Mountain, a distance of some 20 miles.

Chandler Mountain at its south-west end or at the head of Greasy Cove is connected on to Blount Mountain by a high gap of the uppermost sub-carboniferous rocks or of Mountain Limestones, the Coal Measures of the two mountains being entirely disconnected or removed by denudation from over this connecting link. Chandler Mountain is a long narrow mountain with a north-east and south-west trend. It is some 8 miles long with a width of from 1 to 1½ miles, and an area on top of some 10 square miles. It has precipitous sides that are capped with a high bluff. Its summit is from 900 to 1000 ft. above the adjacent *flat woods* of the Coosa Valley. It is a shallow synclinal trough and is made up almost wholly of Coal Measures, the sub carboniferous strata cropping out low down on the sides of the mountain. The Lower Conglomerate or Millstone Grit forms the high capping bluff around the brow of the mountain and, according to Gen. Gibson, is in this mountain from 80 to 100 ft. in thickness. It also, according to Gen. Gibson, is the surface rock of the top of the mountain except up near the north-east end where there is a basin with higher strata carrying two seams of coal. These two seams of coal, he says, have been worked in S's 27 and 28, T. 12, R. 4 E., but now the pits are filled up and the character of the coals in them can not be seen. These coals, however, as he says, can be seen in the S. W. corner of S. 33, T. 12, R. 4 E., where they have also been dug into. Here the upper seam is a soft impure coal of about 2 ft. in thickness,

of little value; and the lower seam, 40 ft. under the upper one, is in two benches of from 12 to 14 inches each in thickness that are separated by from 8 to 24 inches of slate. These two coal seams, he says, are in loose friable sandy strata. They most probably correspond to *Coals (5) and (6)* of the General Section on page 192.

The Coal Measures under the capping bluff of Millstone Grit, or the sub-conglomerate measures, are in this mountain highly developed. They must be some 700 feet in thickness. They carry, according to Gen. Gibson, four known seams of coal. These seams, he says, on the out crops, are thin, but have never been thoroughly tested. The uppermost seam, which is just under the capping bluff of *Millstone Grit*, is said to be on the south-east side of the mountain near Mr. Jehu Stephens, about 18 inches thick on the out-crop. The next seam, which is placed about 150 feet under the uppermost one, is given a thickness on the out-crop of about 1 foot; and the next, or third seam from the top one, is said to be probably about 100 feet still lower: its thickness is unknown. The bottom seam is reported to be at the base of an immense bed of slate, and to be too thickly covered by debris to see its thickness. These four sub-conglomerate coal seams doubtless correspond to the four lowest coal seams of the General Section on page 192.

B. Coal Measures of the Cahaba Coal Field in St. Clair County.—These measures embrace the north-east end of the Cahaba Coal Field and cover an area of about 50 square miles. Being near the line of greatest disturbance of the great Appalachian revolution, their strata have been very much disturbed, and so they now form a broken country. Their area is bounded on the north-west, and partly on the north-east, by a bluff and high rim of Millstone Grit, and on the south-east by a great fault that brings Cambrian strata in contact with them. Along this fault the vertical displacement of strata is 10,000 or more feet.

The prevailing dip across the entire width of the field from the north-west edge to the perpendicular strata along

the south-east boundary fault is to the south-east and hence the field is practically a monoclinal basin. The dip varies from 6° to 8° of the Millstone Grit along the north-west edge to 65°, 80° and to even a perpendicularity along the south-east edge. Locally, however, from folds in the strata, the dip is frequently to the north-west. The prevailing dip around the high north-east rim of the field is towards the coal field or to the south-west, and so a basin shape is given to this end of the field. As the prevailing dip across the entire width of the field is to the south-east, and as this dip is much greater than the inclination of the surface, the measures must of course thicken in this same direction and be thickest along the south-east edge of the field. These thickest measures in St. Clair county, as reported by Mr. Joseph Squire, M. E., are about 4,350 feet thick, and have 17 seams of coal that range in thickness from 6 inches to 11 feet 6 inches, with an average combined thickness of near 50 feet of coal. Of these 17 seams, 10 have an average of two feet and over each in thickness of coal; of these 10 seams, 7 have an average of 3 feet and over each in thickness of coal; of these 7 seams, 3 have an average of 4 feet and over each in thickness of coal; of these 3 seams 2 have an average of 5 feet and over each in thickness of coal, and of these 2 seams one has an average of over 10 feet in thickness of coal.

These coal seams, from their steeper dip, crop out in much narrower areas than do those in the Warrior Field, and for this same reason are much less above drainage level than those of that field. Most of the coals of these seams are reported to have a bright and shiny luster and to be remarkable for their pureness and dryness.

A report on the Cahaba Coal Field, and a map of the field, by Mr. Joseph Squire, M. E., Assistant Geologist, in charge of the Cahaba Coal Field, has lately been published by the State Geological Survey. The map is a most handsome piece of work; it is the work of a life-time, as it has been prepared from surveys made during the last 30 years. It shows the topography of the field, the division of the field

into different coal basins, the larger faults of the field, the lines of out crops of the different seams, etc., etc., etc. It shows, in graphic sections across different portions of the field, the structure of the field; and, in vertical sections, the thickness of the measures, the coal seams in their proper positions, etc., etc., in different portions of the field.

To this report and map, by Mr. Squire, the reader is respectfully referred for a detailed description of the Coal Measures of the Cahaba field in St. Clair county.

C. Coal Measures of the Coosa Coal Field in St. Clair County.—These measures comprise the north-east half of the field, about 145 square miles. The limits of this field can be marked out with tolerable accuracy, but comparatively little is known of its interior. The north-east end of the field is in Calhoun county, about one mile to the east of the Coosa river, the county line. It resembles the Cahaba Coal Field in that it is a long, narrow field, with a north-east and south-west trend. The portion within this county is near 35 miles in length and has a maximum width of only about 6 miles. It is bounded on the north-west and north-east by a high bluff and rim of Millstone Grit, the *Lower Conglomorate* of Safford, and on the south-east by a fault in a comparatively low country. This fault is much smaller than the one along the south-east edge of the Cahaba field, as the lowest rocks along it, to the south-east of it, are of the Trenton Group. The prevailing dip across the entire width of this end of the field is to the south-east. It is from 45° to 35° to the south-east along the north-west and gradually diminishes to the south-east to that of only 15° to 12° to the south-east near the fault along the south-east edge of the field, where it suddenly becomes steep, or more than perpendicular from the strata having been pushed over to the north-west until the bottom ones are on top and have a dip of 75° to 80° to the south-east and more. This end of the field is therefore in appearance a monoclinal basin, though in reality it is an irregular synclinal with the axis along near the south-east edge of the field. See Section 2.

The strata of this field have been greatly disturbed and hence are probably badly faulted. As the prevailing dip is to the south-east, the thickest measures are of course near the south-east edge of the field. These thickest measures are something like 2000 feet in thickness and are said to have three workable seams of coal that range in thickness from 3 to 4 feet. They are believed to be very variable in thickness and in many places in this county too thin to be worked. They have been mined however for a great many years at Ragland and Broken Arrow. The coal appears to be rather friable or soft for stocking purposes but well suited for coking. There are other seams of coal in these measures, both above and below the three workable seams mentioned, but they are believed to be too thin to be of any commercial value.

A seam of coal, reported 3 ft. in thickness, was struck in the Coosa River in blowing out the channel to Lock No. 2, in the S. E. corner of S. 24, T. 14, R. 5 E. There are said to be out-croppings of coal in the S. E. ¼ of S. 9, T. 15, R. 5 E.; in the S. E. ¼ of S. 7, T. 15, R. 5 E.; in the N. E. ¼ of N. W. ¼ of S. 7, T. 16, R. 4 E.; in the N. E. ¼ of N. E. ¼ of S. 1, T. 16, R. 3 E.; in S. 14, T. 17, R. 2 E.; in the S. W. ¼ of N. E. ¼ of S. 27, T. 17, R. 2 E.; and in the N. W. ¼ of S. E. ¼ of S. 33, T. 17, R. 2 E. The coal in the S. W. ¼ of N. E. ¼ of S. 27, T. 17, R. 2 E. is about 8 inches thick; it is soft and is good for coking and blacksmithing purposes. It is just under a soft black smut about 2 ft. in thickness.

In the railroad cut about one-half mile west of Eden on the G. P. R. R., the strata, shales and sandstones, gradually curve from a dip of about 85° to S. E. on the out-crop to that of about 70° to S. E. at the bottom of the cut some 30 ft. deep. They are also in small waves or wrinkles. The dip gradually becomes less steep to the west or north-west until a fault is struck, within a short distance, near the western end of the cut.

12.—THE COAL MEASURES OF SHELBY COUNTY.

The Coal Measures of Shelby county comprise about 240 square miles and are embraced in the Cahaba and Coosa Coal Fields.

A.—THE COAL MEASURES OF THE CAHABA COAL FIELD IN SHELBY COUNTY.—These measures cover about 130 square miles. They embrace the broadest portion, about 15 miles in width, and hence the thickest measures and all of the coal seams in the Cahaba Field. The county line on the north-west for some 12 miles or more is along the top of the high rim of *Millstone Grit* of the north-west edge of the coal field. The surface of these measures is broken and conforms strictly to the geological structure of the country. Ridges and valleys have been formed to run with the general strike of the strata in a north-east and south-west direction; the ridges being of the out-crops of the harder strata and the valleys of the out-crops of the softer strata. The thickest measures are along the south-east edge of the widest portion of the field, because the prevailing dip across the entire width of the field is to the south-east. The dip gradually changes from 6° to 8° to S. E. of the Millstone Grit along the county on the north-west to that of being almost flat near the center of the field and then, in places, suddenly changing to a very steep dip to the south east along the south-east edge of the field near the great boundary fault.

The thickest of these measures, according to Mr. Jos. Squire, M. E., are estimated at over 5,000 ft. in thickness and have 49 seams of coal with an average combined thickness of coal of near 100 ft. Of the 49 seams of coal, 19 have an average of 2 ft. and over each in thickness of coal; of these 19 seams 11 have an average of 3 ft. and over each in thickness of coal; and of these 11 seams 3 have an average

of 5 ft. and over each in thickness of coal. These coals have the disadvantages of being in a broken country and in many places of being highly inclined and doubtless badly faulted. As a general thing, they are comparatively pure, hard and dry coals, with a bright and shiny luster.

For a detailed description of these measures and their coals, the reader is respectfully referred to the late report and map on the Cahaba Coal Field by Mr. Jos. Squire, M. E., Assistant Geologist in charge of the Cahaba Coal Field.

B.—Coal Measures of the Coosa Coal Field in Shelby County.—These measures embrace about 110 square miles. They are in the south-west end of the field and are of two separate or distinct parts of almost equal areas. (See map.) The south-eastern of these parts is cut off from the other part, or from the south-west end of the main field, by a fault and a narrow monoclinal valley of sub-carboniferous strata to the south-east of the fault. The north-west part or the portion of the main field in this county embraces some 60 square miles while the south-east part or the *cut-off strip* has in it about 50 square miles. Both of these parts are bounded on the north-west by high rims and bluffs of the *Millstone Grit* which round off their south-west ends. They both form a broken country that presents many wild and picturesque scenes. Their strata have been very much disturbed and hence are doubtless badly faulted. In both parts, the prevailing dip of the strata is to the south-east, and so their thickest measures are near their south-east edges. These strata are principally of the hard weather resisting strata near the base of the measures, mostly conglomerates and sandstones, and over much the greater parts of both areas are less than 600 ft. in thickness. Both of these parts however have a maximum thickness of Coal Measures of perhaps 2000 ft. and more.

The north-west part for some 10 miles to the north east from its south-west end is bounded on the south-east by a fault, and is made up of highly tilted strata that are badly

faulted. The rest of this part to the north-east, to the county line, a distance of some 15 miles, is an irregular synclinal trough with the bottom or axis of the trough near its south-east edge and the strata to the south-east of the axis, or near the boundary fault on the south-east, very highly inclined to the north-west. The boundary fault along here is in places in sub-carboniferous strata just to the south-east of the Coal Measures. In a portion of this irregular synclinal trough, there is along the south-east edge a high anticlinal ridge with a broad arch.

The strata gradually flatten from a dip of 30° to 70° to the S. E. of the conglomerates along the north-west edge to the bottom of the trough and then suddenly rise to a dip of from 30° to 80° to the N. W. This part has at least three seams of coal, but they are believed to be too thin and variable to be of any commercial value. Two of these seams, however, are said to measure in places, respectively, 2 feet and 4 feet in thickness. The south-east part, or the *cut off* slip, is some 25 miles long. From its south-west end for about 8 miles to the north-east, to a cross fault, it is about four miles in width and is an irregular broken synclinal trough that is bounded on the north-west, south-east, and south-west by a high rim and bluff of *Millstone Grit.* The rest of this south-east part, the portion to the north-east of the cross-fault, is about two miles in width and is a monoclinal basin that is bounded on the north-west and north-east by the high rim and bluff of Millstone Grit, and on the south-east by a fault in a comparatively low flat country. This boundary fault appears to continue to the south-west of the cross fault through the irregular synclinal basin, though with a diminished displacement of the strata along it. This south-east part is scalloped or notched in its broad south-west end where the above boundary fault is supposed to come out.

There are in this south-east part four known seams of coal. They vary very much in thickness and as a general thing are believed to be too thin to be of any value, though the uppermost seam in an out-cropping in the N. E. ¼ of N. W.

¼ of S. 4, T. 20, R. 1 W., is from 9½ to 10 feet in thickness, without any partings, and the one next to the bottom in an out-cropping in the N. W. ¼ of N. W. ¼ of S. 27, T. 19, R. 1 W. has the following section:

OUT-CROPPING IN THE N. W. ¼ of N. W. ¼ of S. 27, T. 19, R. 1 W.

(9) *Shale;* cover.
(8) COAL, 5 in.
(7) *Slate.* 2 in.
(6) COAL, 16 in.
(5) *Slate,* 2 in.
(4) COAL, 24 in.
(3) *Slate,* 2 in.
(2) COAL, 4 in.
(1) *Shale;* underbed.

This out-crop is so badly weathered as to tell nothing as to the quality of the coal. The dip is 50° to 60° to S. E. About 15 feet over this seam of coal there is said to be a clean seam of coal from 2 feet 6 inches to 3 feet in thickness.

The coal of the uppermost seam, in the above out-crop, is very soft and is of a peculiar laminated structure. It is so soft as to be easily hid on the out-crop and is doubtless a good blacksmithing and coking coal. The underbed is a soft argillaceous shale and the cover is a hard reddish shale. The dip is about 50° to the S. E.

The lowest of these seams, which is under the *Millstone Grit*, is said to have been dug into in the N. E. ¼ of S. 4, T. 19, R. 1 E., and in the N. E. ¼ of S. 35, T. 18, R. 1 E., and it is said to be from two to over four feet in thickness. In the potter's clay diggings, just under the Second or *Safford's Upper Conglomerate*, in the S. W. corner of S. E. ¼ of N. W. ¼ of S. 36, T. 18, R. 1 E., there are some thin streaks of coal. This clay, when thoroughly wet, is very plastic, and is well suited for making jugs and common pottery, for which purposes it is extensively used.

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